

PROGRESSIVE MEDICINE





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1909

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PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES
AND IMPROVEMENTS

IN THE
MEDICAL AND SURGICAL SCIENCES

EDITED BY

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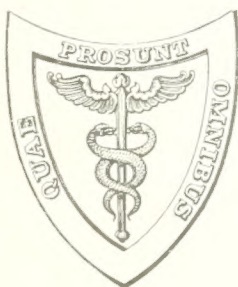
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VOLUME IV. DECEMBER, 1909

DISEASES OF THE DIGESTIVE TRACT AND ALLIED ORGANS, THE LIVER AND PANCREAS—DISEASES OF THE KIDNEYS—SURGERY OF THE EXTREMITIES, TUMORS, SURGERY OF JOINTS, SHOCK, ANESTHESIA, AND INFECTIONS
—GENITO-URINARY DISEASES—PRACTICAL THERAPEUTIC REFERENDUM.



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PROGRESSIVE MEDICINE.

DECEMBER, 1909.

DISEASES OF THE DIGESTIVE TRACT AND ALLIED ORGANS. THE LIVER AND PANCREAS.

BY DAVID L. EDSALL, M.D.

DISEASES OF THE ESOPHAGUS.

Esophageal Diverticulum Seelig¹ describes a procedure that may be of considerable aid in the diagnosis of esophageal lesions, especially in distinguishing between stenosis and diverticulum. His patient a child, aged nine years, presented symptoms of an esophageal stenosis. It was impossible, by the use of a bismuth emulsion, to determine definitely whether there was simple stricture with dilatation or diverticulum. The child was therefore permitted to swallow a very fine gold chain, when the skiagraph showed the chain coiled in the diverticulum. He further made the observation that in a normal individual the esophagus runs almost directly in the midline of the body, which is somewhat contrary to previous belief.

Cervical Glands in Esophageal Carcinoma. A rather interesting case is reported by Mitchell.² The patient, a man, aged thirty-eight years, complained of loss of weight, but practically nothing else to indicate his malady. He stated that he had had stomach trouble for many years. Examination revealed nothing excepting a decided nodular enlargement of the lymph glands on the left side of the neck, along the sternomastoid muscle, and a slight enlargement of the corresponding glands on the right side. Subsequently these nodules became larger and softer. The patient had a slight cough at this time; and after extended examination one tubercle bacillus was found in his sputum. A diagnosis of tuberculous adenitis was made, and the lymph glands were removed. On

¹ Surgery, Gynecology, and Obstetrics, 1908, vol. vii, p. 271.

² Boston Medical and Surgical Journal, 1908, vol. ii, p. 898.

microscopic examination, these were found to be carcinomatous, the pathologist venturing the opinion that the primary seat was probably in the esophagus. Shortly afterward the typical symptoms of carcinoma of the esophagus presented themselves; and the patient died soon afterward. As the author says, the case is one that may be of service to others in the diagnosis of carcinoma of the esophagus, for occasionally cervical metastasis of carcinoma of both stomach and esophagus occurs without any local symptoms of the primary growth.

Cardiospasm. Plummer¹ presents an interesting contribution to the subject of cardiospasm, based on forty cases coming under his own observation. The nature and etiology of the condition remain within the domain of conjecture. The following factors have been held by various observers to be the basis of the condition: Primary cardiospasm (Meltzer), primary atony of the musculature of the esophagus (Rosenheim), simultaneous presence of cardiospasm and paralysis of the circular fibers of the esophagus brought about by paralysis of the vagus (Kraus), congenital disposition (Fleiner, Zenker, Luschka, Sievers), primary esophagitis (Martin), kinking at the hiatus esophagi. The fact that there is almost always a certain amount of dilatation of the esophagus associated with the cardiospasm has caused much of the confusion in regard to the primary nature of the condition.

Some look upon the dilatation as the primary factor, whereas others claim that it is but a sequel to the spasm of the cardia. Though he thinks that primary atony of the esophageal muscle may occasionally occur, Plummer doubts its being the primary factor in many of the cases so reported. He finds support for his view in the fact that in the study of a large number of cases he has almost invariably obtained a history of spasm at the onset, followed, at a later period, by the evidence of dilatation, that is, retention of food in the esophagus. This view is further borne out by the evidence of muscular hypertrophy in nearly all cases that have come to post mortem. Early in the disease, by the frequent observation of severe cardiospasm unaccompanied by dilatation of the esophagus, and by the good results that have attended forcible dilatation of the cardia. The occasional case in which spasm cannot be demonstrated does not, he believes, exclude its being the primary factor; for the spasm is in many cases periodic, and after dilatation takes place, little, if any, more than the normal tone of the cardiac sphincter is required to produce evidence of stenosis.

A few cases have been reported associated with gross lesions of the esophagus—such as ulcers, fissures, and small carcinomas situated at the cardia—as well as with carcinoma of the stomach. Plummer has observed three cases of carcinoma complicated by cardiospasm, and one case of hourglass stomach with secondary cardiospasm. Esophagitis and ulcer of

¹ Journal of the American Medical Association, 1908, vol. ii, p. 549.

the esophageal wall not in close proximity to the cardia, Plummer thinks, are to be looked upon as secondary to the cardiospasm and dilatation, and not as primary factors. In the majority of cases he found no manifestations that could be looked upon as of etiological significance. Cardiospasm is not often present in inflammatory conditions of the esophagus that come under observation, and evidences of esophagitis previous to the onset of the cardiospasm could not be elicited in any of his cases. In but three of his cases were there any neurasthenic symptoms. The average age of the patients was twenty-nine years. Twenty-two of his patients were females, and eighteen males.

In the development of cardiospasm, three stages, more or less clearly defined, may be recognized in the clinical histories:

1. In the first stage the peristaltic contraction of the esophagus is sufficient to force the food through the spastic cardia. This stage is characterized clinically by the complaint of discomfort, pain, and a choking sensation.

2. In the second stage the peristaltic force of the esophageal muscle is no longer able to overcome the resistance of the contracted cardia, and the food is immediately regurgitated. This may result from an actual or a relative increase in the obstruction of the cardia; that is, the spasm may become accentuated, or the esophageal muscle may tire under the unusual amount of work to which it is subjected. In some cases, the spasm is sufficiently severe from the onset to cause the immediate regurgitation of food. In this stage there is found hypertrophy of the esophageal musculature. As the spasm increases in severity, the esophagus becomes less and less able to overcome the obstruction, and dilatation results.

3. The third stage is characterized clinically by the retention of food in the esophagus and its regurgitation at irregular intervals after ingestion. If the spasm is mild for a sufficient length of time from the onset, the hypertrophy may be of such a degree that dilatation does not take place at all or is delayed for some years. When hypertrophy is well developed, it may overcome very marked resistance at the cardia. On the other hand, relatively frequent severe spasms at the onset may lead to early dilatation, before hypertrophy has time to develop. An impaired tone in the esophageal muscles at the onset of the trouble may also tend to the early dilatation that occurs in some instances.

The symptom complex in cardiospasm is, as a rule, sufficiently distinctive to permit of its easy recognition. It may be divided into the three stages noted above: (1) Cardiospasm without food regurgitation; (2) cardiospasm with immediate food regurgitation; and (3) cardiospasm with dilated esophagus, manifested by retention of food in the dilated portion and its regurgitation at irregular intervals after taking. In the majority of cases the first attack of spasm occurs suddenly and unexpectedly, when the patient is at the table. A spasmodic choking

sensation is felt at some point in the course of the esophagus, generally located at the cardia, and radiating to the back or the neck. It is rarely described as pain. Some patients locate the discomfort entirely in the epigastrium, in the left hypochondrium, or in the upper portion of the esophagus. This sensation may occur independently of the taking of food. At times the spasm is described as a slight delay in the passage of food; or the food "seems to stick beneath the lower sternum." In one of Plummer's cases many physicians had, during the course of twenty years, agreed with the patient in attributing the obstruction to an adenoma of the thyroid. As a rule, the spasm is distinctly periodical in the earlier stages of the disease; but as the condition develops, mild spasm becomes more continuous or constant. Marked exacerbations in the spasm, when it is more or less continuous, are quite characteristic.

In the second stage the food is regurgitated immediately after being swallowed. In this stage, also, periodicity is a characteristic feature. One of Plummer's patients had periods of three to seven days in which all solid food was immediately regurgitated, alternating with periods of days or weeks of absolute freedom from dysphagia.

After dilatation of the esophagus has occurred, the spasmodic choking sensation may be absent. In this stage usually the first portion of each meal is retained. After the sac becomes filled, additional food either is regurgitated or forces the preceding portion into the stomach. Of the contents of the esophagus at the completion of a meal, the more fluid portions may slowly seep through the cardia, while the solid food is either vomited at irregular intervals or remains in the sac until the next meal is taken. Solid food, like meat, may be delayed at the cardia for several days, softer food, in the meantime, passing into the stomach. The sac is never completely emptied, several ounces of solid food often being present in the dilated esophagus, even though the patient states that it seems to be passing through. Plummer has frequently withdrawn from two to sixteen ounces of food after twenty-four to thirty-six hours of fasting. The patients usually complain of a sense of weight and discomfort in the chest. The vomiting is painless, and is but rarely accompanied by nausea. Some patients insist that the food enters the stomach, but will not stay there; but the majority state that it lodges beneath the lower portion of the sternum. Ten patients of Plummer's series complained of waking at night to find the nasal passages filled with food.

Plummer states that in the diagnosis and study of a case of cardiospasm, the following points should be demonstrated: (1) The food is regurgitated from the esophagus and not from the stomach; (2) the existence and character of the obstruction at the cardia; (3) the presence or absence of esophageal dilatation, its shape and size; (4) the presence or absence of gross lesions in the esophagus or neighboring organs, which might excite the cardiospasm. In the demonstration of these

points various methods must be resorted to, such as the passage of stomach tubes and bougies; radioscopy after the ingestion of a bismuth-containing food; and esophagoscopy.

Plummer has been most successful in the treatment of these cases by dilating the cardia by means of a dilator, which he has devised. He has found this method more satisfactory than the older forms of treatment, consisting of tonics, a non-irritating diet, effervescent drinks, bromides, and the frequent passage of large sounds. The first four cases in his series were operated upon. One of these patients completely recovered; two were lost sight of; and the fourth was afforded much relief for seven years by the frequent passage of a large bougie. A number of Plummer's patients were cured by as few as two treatments, consisting of dilatation of the cardia. Eleven of the patients in his series had a recurrence, which was completely cured by the second course of treatment.

In cases in which cure occurs very readily there must be a question whether the condition is not of the almost purely neurotic and chiefly psychic type, and hence of a wholly different and much less dangerous category than those in which structural changes tend to occur as a consequence of the spasm or atony. Cases of this type are, of course, relatively common among neurotic persons, and they are not infrequently subject to cure by purely psychic influences, or, at any rate, the psychic factor is the chief element in the cure. In such cases any such measure as the passage of a bougie of any kind has as one of its main effects, if not the only effect, the psychic impression that it produces. Such cases must be separated from the others in judging of the diagnosis, the prognosis, and effects of treatment.

DISEASES OF THE STOMACH.

The Salomon Test. Rose¹ has made a comparative statistical study of the value of the Salomon test and the Grafe-Röhmer hemolytic test in gastric disease. *The Salomon test*, originated by the man whose name it bears, in 1903, is performed as follows: In the evening the stomach is washed until it is perfectly clean. The next morning 400 c.c. of physiological salt solution are used to wash out the stomach, the fluid being repeatedly introduced and withdrawn until all fluids or substances that may have collected in the stomach during the night are entirely removed. The nitrogen content of this fluid is then determined by the Kjeldahl method, and the result expressed in grams of nitrogen in 100 c.c. The albumin content can also be estimated according to the Esbach method. The test is supposed to be of especial value in the diagnosis of *carcinoma*

¹ Deutsches Archiv f. klin. Med., 1909, Band, xev. Heft 5 and 6, p. 518.

of the stomach. According to Salomon's view, serum albumin is secreted into the stomach from the ulcerated surface of the gastric carcinoma; and the washing obtained from a case of gastric carcinoma would, in these circumstances, contain more albumin than would the washings from a non-carcinomatous stomach. Consequently, the determination of the nitrogen content of the normal stomach after gastric lavage, as described above, is of great importance. Salomon considers that a case in which more than 20 mg. of nitrogen to 100 c.c. is found should be looked upon as very suggestive of carcinoma. Sigel and Witte look upon a content of 25 mg. or over as suspicious; whereas, Zirkelbach places the low limit at 30 mg. The estimation of albumin by Esbach's method can be looked upon as suggestive of carcinoma when a faint cloudiness occurs, or when more than one-sixteenth per mille is found.

Rose presents the chief points in a number of cases in which the Salomon test was of valuable assistance in establishing a diagnosis. In some cases, in which the clinical aspects pointed toward carcinoma, the Salomon test was negative; and at operation no carcinoma was found. In other cases, in which the symptoms were more or less suggestive of carcinoma, the Salomon test spoke for or against the diagnosis, and in the majority of the cases the postmortem or operative findings were in harmony with the results of the test. Several cases have been reported, as those of Schittenhelm and Lowes, in which high nitrogen contents have been found in non-carcinomatous stomachs. One case was that of a girl with nervous hyperacidity, in which a nitrogen content of 28.8 was found. The other was a case of gastrosuccorhea, in which the nitrogen content was 28.6 mg. Witte has also reported a case of gastrosuccorhea that showed a nitrogen content of 26.6 mg.; and Sigel has reported a case of benign pyloric stenosis in which the Salomon test showed 28.6 mg. of nitrogen. On the other hand, in some cases of carcinoma, exceptionally low values have been determined. Zirkelbach, for instance, mentions two cases of carcinoma of the stomach in which the nitrogen content was respectively 5.3 and 8.3 mg. It is not impossible that these were cases of infiltrating carcinoma, in which, on account of the absence of ulceration, the Salomon test does not show a large nitrogen content. Berent, Gutmann, and Witte have reported such cases. Rose claims, however, that in general the test may be looked upon as a helpful one. In his 37 cases, Rose found the nitrogen content in non-carcinomatous gastric diseases to be between 4 and 18 mg. There was no cloudiness with Esbach's reagent. In the carcinoma cases the nitrogen content was between 24 and 57 mg. Esbach's reagent showed an intense flocculent precipitate, and the albumin was between one-eighth and one-half per mille.

The results of the Salomon test and the Grafe-Röhmer test, which latter I described in *PROGRESSIVE MEDICINE* last year, agreed in all but 4 cases. In but 2 cases among 35 did the Salomon test lead to

a wrong diagnosis, and in but 1 case among 31 did the hemolytic test lead to erroneous conclusions. In only one case did both tests lead to an erroneous diagnosis. This was in a middle-aged patient with gastrop-tosis and gastric ulcer. Moreover, all the clinical aspects of the case pointed also to gastric carcinoma; and both the Salomon and the Grafe-Röhmer tests were positive. Rose concludes that both tests are useful, but that the best results are to be obtained when the two are applied in the same case. Especially in gastric ulcer, in which the hemolytic test is frequently positive, will the Salomon test be found of value in deciding whether a benign or a malignant condition exists.

I have the feeling, most decidedly, however, that the methods of studying hemolysis, especially attempts to study hemolysis quantitatively, are as yet so subject to error that we must be very cautious indeed in using them for clinical purposes. Tests for cancer of the stomach are getting to be almost as numerous as the drugs used in treating whooping cough. This clearly means, of course, that this is a very difficult as well as a very important diagnosis, but it means also that we can hardly expect any one test to have more than a fractional contributory value, and we must at least attempt to avoid errors that were committed in the relatively early days of the study of stomach content, when the enthusiasm due to the use of entirely new means of diagnosis led to attaching nearly pathognomonic value to some of the first used tests, particularly those for cancer of the stomach.

Effects of Drugs on Peptic Digestion. Ascher¹ contributes some very interesting results of experiments on the influence of various medicaments on peptic digestion. The estimations were made by means of the Jacobi-Solms method, which latter was detailed in *PROGRESSIVE MEDICINE* of last year. Ascher's experiments do not concern the influence of drugs on the production of pepsin, but purely their influence on peptic digestion, regardless of whether the drugs be conducive to the secretion of pepsin or not.

The first series consisted of experiments on the influence of solutions of various salts upon peptic activity. It was found that sodium chloride, except in very concentrated solution, had practically no inhibitory effect upon peptic digestion. Saturated solutions, however, did exert a distinct inhibitory effect. Sodium sulphate was found to have no inhibitory effect on peptic digestion, even in concentrated solution. Solutions of potassium iodide and sodium iodide were found to exert an inhibitory effect only in saturated solution. Then, however, the effect was very evident.

In the second series of experiments the influence of various acids on peptic activity was studied. If lactic acid was introduced, instead of decinormal hydrochloric acid, ordinarily employed in the Jacobi-Solms

¹ Archiv f. Verdauungskrankh., 1908, Band xiv, Heft 6, p. 629.

method, it was found to permit active peptic digestion in weak solution. If hydrochloric acid was added to the lactic acid, digestion took place much more rapidly. Only when concentrated solutions of lactic acid were added did peptic digestion, in the presence of hydrochloric acid, seem to be greatly inhibited. Ascher thinks that this experiment explains the clinical observation that gastric digestion occasionally seems to be well performed in some cases, when lactic acid and no hydrochloric acid is present. The failure of digestion in the presence of strong lactic acid is, in all probability, a result of the destruction of the pepsin by the acid. Acetic acid was found to possess practically the same properties as lactic acid in regard to peptic digestion.

Finally, alcohol, sodium salicylate, various iron and arsenic solutions, the bitter tonics, and tannin were employed. Practically all these substances were found to have a distinct inhibitory effect upon peptic digestion. This effect was especially noted with iron preparations and with tannin. The preparations of iron that are ordinarily employed in therapeutics could not be tested, on account of their complicated structure and their slight solubility; but both iron sulphate and liquor ferri sesquichloridi possessed a profound inhibitory effect on peptic digestion.

Various arsenic preparations did not possess so marked an inhibitory effect as did the iron preparations. Of the arsenic preparations, sodium cacodylate and atoxyl possessed the least deleterious effect. The various bitter stomachics, especially quinine derivatives and extract of condurango, exerted slight to marked inhibitory effects. Tannin was found to be especially powerful in reducing the activity of peptic digestion—an effect which we should anticipate because of the effect of tannin upon protein substances, and whatever the nature of pepsin and some other ferments may prove to be, they are usually either themselves protein or are combined with protein. The same may be said of alcohol and iron.

That the influence of a drug on the activity of peptic digestion does not go hand in hand with its influence in producing the secretion of a powerful flow of gastric juice is demonstrated by the fact that though bitter stomachics, as shown by Ascher's work, inhibit peptic digestion, they have been shown by numerous experiments on both animals and man to be excitants of the flow of gastric juice. Ascher's experiments help to show why some drugs, such as sodium salicylate, alcohol, and even iron, are not well borne by the stomach; though, in addition to this inhibitory effect upon peptic digestion, and more important than this, such drugs usually exert a directly irritating effect upon the gastric mucosa.

Influence of Intestinal Derangements on the Stomach. Clinicians have for many years recognized that intestinal derangement may manifest itself especially by gastric symptoms, and that gastric disorders may present symptoms more suggestive of intestinal than of gastric derange-

ment. Cohnheim and Dreyfus¹ made some experimental observations, vividly demonstrating the effect of intestinal derangement on gastric secretions. The dogs with which they were working were operated upon so that two intestinal fistulae resulted, in one of them, immediately below the pylorus, in the other, lower in the duodenum, below the entrance of the pancreatic and bile ducts.

They first observed the effect of gastric irritation on gastric secretion. To this end they introduced into the stomach either water, at 55° C., or an ice-cold 5 per cent. solution of ammonia. Immediately after this procedure the dogs vomited, refused to take nourishment, and presented the general appearance of being seriously sick. They soon recovered, however; and then the gastric digestion appeared perfectly normal. Motility was entirely undisturbed, and the secretion showed only the slightest variation from the normal.

Quite different results attended their introduction of irritating substances into the intestines. Into the lower duodenal fistula they introduced either 400 c.c. of a 4 per cent. sodium chloride or a 4 per cent. magnesium sulphate solution. Shortly after either of these solutions was introduced diarrhea commenced and the dogs seemed to feel generally miserable. They seemed to be greatly nauseated; the objective signs of gastric disturbance were undoubted. When the sodium chloride solution was introduced into the intestine coincidently with the feeding of the dog, the stomach commenced to empty itself one and one-half to two hours and a half after taking the food, instead of almost immediately, as normally occurs. The entire period of gastric digestion was approximately twice the normal period. The same phenomena, so far as motility is concerned, were presented after the introduction of magnesium sulphate solution. The two solutions, however, were attended with different results so far as secretion was concerned. Magnesium sulphate induced a definite hyperacidity, whereas sodium chloride induced a hypo-acidity. After a test breakfast the normal dog gives a total acidity of from 52 to 70; free hydrochloric acid, 20 to 30. After the introduction of magnesium sulphate into the intestines the total acidity rose to from 81 to 116, and free hydrochloric acid, 40 to 71. After the introduction of sodium chloride solution the total acidity varied between 14 and 42, and free hydrochloric acid between 4 and 12.

Cohnheim and Dreyfus look upon the results of their experiments as extremely important, and think that the disturbance of both gastric secretion and motility after the introduction of irritating solutions into the intestines indicates that many gastric disorders may be purely of intestinal origin. This is especially suggested by reason of the fact that irritants introduced into the stomach did not produce the derangements of function that attended the introduction of irritants into the

¹ Münch. med. Woch., 1908, p. 2484.

intestines. The experiments, however, were hardly numerous or varied enough to permit of such sweeping deductions as the authors seem inclined to make.

Cohnheim and Dreyfus made several other observations in their experiments that are possibly of considerable importance to gastro-intestinal medicine. I discussed, last year, the layer-like arrangement of the stomach contents during digestion. Some observers were inclined to look upon this phenomenon as destroying, to a great extent, the reliability of the results obtained from the administration of a test meal or test breakfast. Cohnheim and Dreyfus showed that the dog presents practically the same value for total acidity and hydrochloric acid after the administration of a test breakfast or a test meal as does the normal man, and they found that the values obtained by passage of the stomach tube were practically the same as those obtained by testing the entire mass of contents present in the stomach. At present, however, we must consider the point of view regarding this matter that was presented last year as most closely representing facts so far as we can see them.

Effects of Menstruation on Digestive Organs. The influence of menstruation on the gastric functions and the various gastro-intestinal phenomena occurring during menstruation have been the topics of numerous contributions to the literature of gastro-intestinal medicine in the past. Ewald called especial attention to gastro-intestinal hemorrhages and the vomiting of blood at the menstrual period. He believes that these can be looked upon, in many instances, as a vicarious menstruation—a view that, at the present time, is very generally considered to be correct. These phenomena are usually seen in neurotic women with dyspeptic complaints and gastralgie pains. Subsequently, he described crisis-like pains in the stomach, and nausea and vomiting, with loss of appetite, which he not infrequently noted in anemic girls at the menstrual period.

Kuttner also considered gastric hemorrhages occurring during menstruation to be, in many instances, vicarious. He observed patients with gastric ulcer who vomited blood at no time except during menstruation. He also found, in a number of instances, a decrease of the hydrochloric acid, even to total disappearance, during menstruation. Kuttner explained these phenomena on the basis of an irritation of nerve trunks related to those supplying the internal genitalia, which reflexly produced congestion of the gastric mucosa. Hood also called attention to the relationship existing between menstruation and gastric hemorrhage.

Boas recognized the relationship between the gastric functions and menstruation in so far as to recommend that test meals be not given during this period, on account of both the alterations in functions and the dangers incident to passing a stomach tube at this time. The alterations of gastric function during the menstrual period have been

studied by numerous observers, but these investigations have been attended with varying results. Quincke and Dettwyler found a decrease in gastric secretion during menstruation, which they attributed to the general loss of blood. Elsner came to the same conclusion. Pariser concluded, as the result of his investigations, that the motility of the stomach is greatly decreased in the menstrual period, and especially in the pre-menstrual period. Singer pointed out that during the menses, often diarrhea, constipation, motor disturbances of the intestines, various secretory neuroses of the stomach, and nervous achylia gastrica may occur. Jaworski claimed that during the menses the amount of gastric juice is decreased, and at times entirely disappears.

Elsner, studying the gastric functions in the ante-, intra-, and post-menstrual periods, both in the empty stomach and after test meals, arrived at the conclusion that hyperacidity occurs at the menstrual period in those patients who manifest an excessive menstrual flow; whereas in the more normal cases subacidity is the rule. He, moreover, came to the conclusion that the motor functions of the stomach are not especially altered during the menstrual period. It must be remarked, however, that Elsner's observations were, for the most part, made on women with gastric disorders.

Ziembicki studied the gastric functions of 17 women before and during menstruation. Of these, 13, or 76.5 per cent., manifested an undoubted hyperacidity during menstruation. One showed subacidity; and in the remaining 3, the results were not conclusive. His observations, moreover, led to the conclusion that during menstruation the motor functions of the stomach are considerably decreased.

On account of these rather contradictory findings, Wolpe¹ undertook the study of the gastric functions in 12 women between the menstrual periods, in the premenstrual period, and in the menstrual period. In several cases his investigations covered two or three successive menstrual periods. He found that in different menstrual periods in the same individual the variations in function were so slight that they may be ignored. The patients in his series included both those with normal functions and those with disturbed gastric functions. He found that in all these individuals there was an increase in acidity during the menstrual period. This occurred in women who, during the intermenstrual period, manifested normal acidity, as well as in those with hypo- or hyperacidity. He found, moreover, that this hyperacidity was accompanied by a hypersecretion, which in some cases practically assumed the proportions of a gastrosuccorhea. Gastric motility he found to be distinctly decreased during both the premenstrual and the menstrual periods.

As a result of his observations, Wolpe offers the following practical

¹ Deut. med. Woch., 1908, vol. ii, p. 2208.

recommendations: Test meals should never be administered during the menstrual period, in order to avoid misleading results. The pathological manifestations that occur during the menses are purely temporary, and have no further significance. As the stomach is subjected to unusual irritation during the menstrual period, in subjects of gastric ulcer hematemesis is more easily induced during this time. Consequently, patients with gastric ulcer should observe the strictest dietary and hygienic regulations during this period.

Influence of Pregnancy on the Stomach. The functional alterations in the digestive organs during pregnancy and parturition have not been investigated so thoroughly as have those occurring during menstruation. Borodenko¹ undertook the study of the gastric secretion during pregnancy in a bitch with a Pawlow stomach. The observations were commenced about two months prior to parturition. At the beginning, this animal manifested normal secretory activity and ate heartily of bread, milk, and meat. As the period of parturition approached she took more milk, less meat, and practically no bread. She seemed to develop such a dislike for bread that if some were put into her mouth, she would fight to spit it out at once. At the same time, the quantity, the acidity, and the digestive power of the gastric juice sank until only mucus of alkaline or slightly acid reaction was secreted. Such was the character of the secretion for the two weeks immediately preceding parturition and for several weeks after it. As soon as the bitch ceased to suckle the pups, the amount, acidity, and digestive power of the gastric juice began to increase; and by six weeks after parturition it had returned to the normal. The desire for other foods than milk returned at the same time, and the animal was eating milk, bread, and meat by the time the secretion had returned to the normal.

Borodenko thinks that the reduction in the amount of inorganic salt in the body is probably the cause of the alterations in gastric secretion. He believes, however, that it is to compensate for this lack of inorganic salt and deficient secretion that the pregnant woman so frequently craves salty or sour substances. We must be cautious about making application of this observation in any extensive practical way. So many pregnant and nursing women have excellent digestion that severe disturbances of secretion are improbable.

Influence of Pelvic Disease on the Stomach. Lewisohn² undertook a study of the gastric disorders of women suffering with pelvic disease. Engelmann claims that 25 per cent. of the women suffering with pelvic disease are also subjects of gastric disorders; whereas Hewitt estimates the percentage as between 11 and 14. Kisch goes so far as to give the name "Dyspepsia Uterina" to the group of symptoms so frequently associated with pelvic and, especially, uterine disorders. Others, notably

¹ Berl. klin. Woch., 1909, No. 23, p. 1060.

² Ibid., No. 24, p. 1103.

Mackenzie and Thailhaber, have interpreted the association of pelvic and gastric disorders somewhat differently, and look upon the pelvic disorders as secondary to the gastric derangements. Giovanni and Sommer consider the association to be a purely accidental one in the vast majority of cases.

Lewisohn studied 100 women complaining of both pelvic and gastric disorders. He found that in 66 of these, the association was purely accidental; and that the pelvic disease could no wise be considered responsible for the gastric symptoms. In the remaining 34 cases, however, he could see a distinct causal relationship between the pelvic and the gastric derangement. These 34 patients suffered with all varieties of pelvic disease. The author does not detail the character of the gastric disorders with which they suffered. The amount of functional secretory derangement is, however, computed from the gastric analysis. Of the 34 patients, 9 manifested anacidity; 18, hypoacidity; 6, normal acidity; and 1, hyperacidity. These results are somewhat different from those obtained in other localities. Sommer, in Graz, found hyperacidity in the majority of his cases; Kehrer, in Heidelberg, found normal secretion to be the rule; whereas, both Winkler and Lewisohn, in Berlin, found hypoacidity. The author thinks it not improbable that the same factor will induce an increased secretion in one locality and a decreased secretion in another.

Infusoria in the Stomach. Some years ago Cohnheim reported a series of cases in which infusoria were found in the stomach contents. He stated at that time that he believed the finding of infusoria in the esophagus or stomach indicated an ulcerating, non-stenosing carcinoma, and that they could be the first expression of a latent carcinoma of these organs; and further, that the occurrence of these organisms in the stools was a purely secondary manifestation, and that their origin in these cases was from the stomach. Since that time he has had the opportunity of observing seven additional cases, which he now reports.¹

The organisms were found in 2 cases of *carcinoma of the esophagus*, 4 cases of *carcinoma of the stomach*, and 1 case of apparently benign *achylia gastrica*. The 6 cases previously reported were all carcinoma, 5 located in the stomach, and 1 in the esophagus. *Trichomonas* was found in 5 of the present series; megastoma in 1; and both *trichomonas* and megastoma and a ciliate in one case. The vast majority of cases reported in which infusoria have been found have been cases of carcinoma of the esophagus or stomach. They have been found in a few cases of apparently benign *achylia gastrica*, but some of these cases are of doubtful value, because the organisms were found in the vomitus, and it is impossible in these circumstances to exclude their having been derived from the mouth—where they not infrequently occur, especially when there are carious teeth.

¹ Deutsche med. Woch., 1909, vol. xxxv, p. 92.

Though Cohnheim has carefully sought for infusoria in all his cases of achylia gastrica and gastric carcinoma, he has found them in achylia gastrica in but the one case mentioned. Furthermore, all the cases of carcinoma in which he has found them have been carcinomas of the stomach wall, and not of the pylorus. The organisms are apparently unable to live in the stagnating acid contents of pyloric carcinoma. The fact that they are not found in the majority of cases of achylia gastrica may be explained on the basis of two facts: first, that in not every patient with achylia gastrica is the opportunity presented for acquiring the organisms; and second, in the majority of these patients the deep folds in the gastric mucous membrane in which the organisms prefer to live and grow are not present. It is the belief of Zabel that the organisms are acquired from drinking-water, and that they find a natural habitat in carious teeth, as well as in certain portions of the intestines when they succeed in passing through the stomach without being destroyed.

In view of the rarity of the occurrence of infusoria in patients with benign achylia gastrica, Cohnheim's case in which this finding was made is of especial interest. It is his belief that the organisms were not present in the stomach in this case, but that they really came from the duodenum. This view he bases on the fact that the material in which he found them was deeply bile-stained. Moreover, as the patient had false teeth, it is quite improbable that they had their origin from the mouth.

The occurrence of infusoria in association with enteritis has not infrequently been observed, and has given origin to the term infusorial enteritis. It is Cohnheim's belief that most of these cases are really instances of achylia gastrica associated with diarrhea, and that the organisms are located, in the majority of cases, in the stomach. In either case they cannot be looked upon as the cause of the gastric or intestinal disturbance, but as a purely secondary phenomenon. He believes, however, that, found either in the stomach contents or in the feces, they speak strongly for the existence of an achylia gastrica due to carcinoma of the stomach wall. Cohnheim suggests that these organisms be looked for in all cases of achylia gastrica, especially those that suggest malignancy. They should be sought for only in the empty stomach. The stomach tube should be first warmed and the material removed should be placed immediately in a warm Petri dish and kept at a temperature of 16° to 17° C.

The question of the meaning of these organisms when found in cases with chronic enteritis, and therefore their probable relation in such cases to an achylia gastrica of either benign or malignant form, cannot be considered to be at all settled. It is not clear either that they have a direct causative relation to the enteritis or that their presence is, as Cohnheim indicates, simply a secondary phenomenon. In a rather large group of cases the evidence is enough to make it impossible

to deny absolutely that they may have caused the trouble or at least have caused it to persist. It appears to me desirable to attempt to determine whether there may not be in these cases a symbiotic relation between these organisms and some bacteria.

Excessive Secretion of Mucus. I mentioned last year an article by Kaufmann on so-called amyxorrhoea gastrica. The opposite condition, an increase in the amount of gastric mucus, *gastromyxorrhoea*, forms the topic of an article by Friedenwald.¹ The term gastromyxorrhoea was first employed by Kuttner. The presence of small quantities of mucus in the fasting stomach had been noted by Ewald, Riegel, and Dauber. The latter pointed out the significance of the condition, on the basis of a well-studied case of Leube's. He employed the term gastrosuccorrhoea mucosa to designate the condition. Kuttner, however, made the first extensive study of the condition, and determined that it was by no means of infrequent occurrence. As was pointed out by Schmidt and Tellerling, small quantities, from 2 to 5 c.c. of mucus, are usually observed in the normal fasting stomach. Kuttner considers the existence of more than 5 c.c. of mucus in the fasting stomach as abnormal. Amounts over 25 c.c. he looks upon as indicative of the condition that he has termed gastromyxorrhoea.

In order to establish a diagnosis of gastromyxorrhoea, the condition must be found to be either constantly present or to reappear at certain intervals. The principal feature upon which the diagnosis is based is the appearance of a large amount of gastric mucus when the stomach tube is introduced into the fasting stomach. The patient must be able to take the tube without difficulty, for much manipulation of the tube or its prolonged use at one sitting may artificially induce an excessive secretion of mucus. The properties of the secretion are defined by Friedenwald as follows:

1. It is grayish white, milky, slimy, and stringy. It contains translucent, swollen lumps or fine specks of mucus, and is without special odor. Pouring from one glass to another, the contents are markedly stringy; and on standing in a conical glass, they separate into two layers—a turbid fluid, the chief part; and a small layer at the bottom, consisting of a whitish sediment enveloping finer and larger lumps and specks with masses of mucus. These particles come from the bronchial, pharyngeal, and esophageal mucous membrane, and are pigmented, and even mixed with pus. Sometimes masses of mucus of translucent, foamy, or purulent nature, coming from the mouth or pharynx, float on the surface of the liquid. In some cases the mucus from the fasting stomach is colored yellowish or greenish yellow, due to a mixture with bile or intestinal secretion. In uncomplicated cases food remnants are never present.

¹ Boston Medical and Surgical Journal, 1908, vol. ii, p. 265.

2. The secretion in typical cases of excessive mucous secretion appears feebly acid, neutral, or often alkaline. The value of total acidity varies between 6 and 8. Free and combined hydrochloric acid could never be detected, nor was lactic acid ever present.

3. The pepsin varied, as determined by the method of Mett, between 2 and 4 mm., and occasionally the ferment was completely absent; at times, markedly diminished.

4. The test for sulphocyanates was negative, and Trommer's test was also negative. On the other hand, the biuret test gave a positive reaction. Gmelin's reaction was sometimes positive, but more frequently negative.

5. When grape sugar was added to the secretion and the mixture placed in an incubator at 37° C., no formation of gas appeared, even after standing several days.

6. The examinations for blood were usually negative, but occasionally positive.

7. The specific gravity of the mixture varied between 1003 and 1010.

8. Determination of the freezing point gave values between 0.29° and 0.44° .

9. The microscopic examination of the secretion obtained from the fasting stomach showed leukocytes and the nuclei of leukocytes, and, more rarely, some of the constituents of the gastric mucosa. Occasionally yeast cells, as well as different microorganisms, were observed. Sarcinæ or budding yeast were never present.

In addition to these microscopic objects coming from the stomach, there could be seen pigmented alveolar epithelium from the bronchial mucous membrane and pavement epithelium from the mucous membrane of the mouth, pharynx, and esophagus. Kuttner points out that while in typical cases the mucous secretion is neutral, alkaline, or slightly acid, with an entire absence of HCl, in a certain number of cases there is a considerable amount of free HCl. It is apparent that these cases must be considered as mixed forms of gastrosuccorhea and gastromyorrhea.

Gastromyorrhea is described as of two types, intermittent and continuous.

Intermittent Gastromyorrhea. Intermittent gastromyorrhea is of rare occurrence, though it is not improbable that many cases are unrecognized, inasmuch as the symptoms are not of long duration and the attention of the physician is not called to them. In the intermittent type the attacks are distinctly paroxysmal in character.

Etiology. The sudden onset of the attacks, without apparent cause, and their distinctly paroxysmal occurrence, causing them to resemble gastric crises, led Kuttner to believe that they might be accompaniments of locomotor ataxia. A thorough study of his cases, however, revealed no evidence of the existence of this disease. In two of his cases the attack had its onset coincident with a vigorous flow of nasal secre-

tion. He was, therefore, led to believe that there was some connection between the secretory activity of the nose and that of the stomach in these cases. He was, however, convinced that in these cases the mucus found in the stomach had not been swallowed.

Symptoms. Occasionally the attack is preceded by prodromal symptoms, such as headache, loss of appetite, and nausea; but more frequently it begins in the midst of perfect health, often early in the morning, soon after the patient awakes. The most striking symptom of the paroxysm is the severe vomiting, which cannot be successfully controlled, after being thoroughly instituted, by any of the remedies that have been tried. The vomited matter consists of large quantities of viscid, slimy liquid, which, after the attack has lasted a time, becomes mixed with bile and intestinal juice. In one of Kuttner's cases, vomiting of bloody fluid occurred at the height of the attack. Pain in the region of the stomach is usually absent; if present, it is slight. During the attack, anything taken into the stomach is usually vomited immediately afterward.

The patient naturally feels weak and altogether wretched. The abdomen is retracted, the pulse small, the tongue dry, and the quantity of urine much diminished. The attack may last from one to twelve days. It usually ceases quite as abruptly as it commenced; and, after cessation, the patient can again take food without any annoyance. Between the paroxysms the patient generally enjoys good health and has very slight, if any, dyspeptic symptoms. The examination of the gastric contents, after a test breakfast in the interval, usually reveals normal amounts of hydrochloric acid and mucus.

The following case occurring in Friedenwald's practice illustrates the typical symptoms of intermittent gastromyxorrhœa. A male, aged thirty-four years, presented himself for treatment for a digestive disturbance that had existed for several years, occurring paroxysmally, and disabling him for a number of days during the paroxysms. Without warning, and when the patient was apparently in the best of health, he would be suddenly seized, early in the morning, with nausea and vomiting which would continue for three to four days. During these paroxysms not even water could be retained on the stomach. The vomited matter consisted of large quantities of ropy mucus, which was often mixed with bile. These attacks recurred at intervals of four to six weeks. Between the attacks the patient was in the best of health, and did not suffer from the slightest digestive disturbance. Physical examination showed him to be a robust individual, whose heart and lungs were normal. On physical examination, the abdomen presented no abnormalities. The stomach was not dilated. The gastric contents after a test breakfast showed a total acidity of 48, free hydrochloric acid, 0.12. The material vomited during an attack showed a total acidity of 5. No ferments were present. Microscopically, leukocytes, a few microorganisms, and disintegrated cells from the gastric mucosa

were seen. The remedies usually employed to control nausea and vomiting, such as creosote, carbolic acid, cocaine, hydrocyanic acid, as well as lavage, proved entirely incapable of controlling the attacks.

Treatment. In the beginning of the attack Kuttner advises a thorough lavage of the stomach, which he believes may terminate the attack. After the attack is well developed, neither lavage nor the administration of drugs appears to have any effect in controlling it. Friedenwald failed to find lavage of value in any of his cases, even though practised early in the attack. Morphine hypodermically he found to give some temporary relief. Between the attacks the effort should be directed to determining the underlying cause that may be responsible for the paroxysm. As this is frequently a neurosis, Kuttner recommends change of climate, hydrotherapy, massage and electricity, and, if the patient be at all anemic, iron and arsenic.

Continuous Gastromyorrhea. The chronic or continuous form of gastromyorrhea is supposed to be more frequent than the intermittent form.

Etiology. The condition may be associated with hypersecretion of acid or with various organic diseases, or it may exist as an independent functional neurosis. Kuttner has found it associated most frequently with the chronic catarrhs, as well as with those nervous affections of the gastric mucosa in which there is a marked diminution or an entire absence of HCl. He observed it also in some cases of gastric ulcer, with or without pyloric obstruction. The condition seems to be favored by the ingestion of starchy food. The site of production of the mucus is not definitely known, but it is in all probability a product of the superficial epithelium and the mucous glands, especially those of the pylorus.

Symptoms. There are no characteristic symptoms of the continuous form of gastromyorrhea. The condition may be accidentally discovered, even when there are no subjective symptoms suggestive of it. The diagnosis is established by the discovery of large quantities of mucus in the fasting stomach, shown to be the product of the gastric mucosa, and not originating from other sources, such as the nose, mouth, or pharynx. According to those who have written upon the subject, subjective symptoms are not essential to a diagnosis.

Treatment. Lavage should be performed for the removal of the mucus, provided that there are no contra-indications to this procedure. Search must, naturally, be made for any underlying condition with which the gastromyorrhea may be associated, and the general state of health of the patient must receive due attention. Kuttner recommends as of especial value the administration of mineral waters, these being chosen according to the special needs of the case.

Acute Interstitial Gastritis. In a review of the literature of acute interstitial gastritis, Münter¹ states that up to the present about ninety cases have been reported. This inflammation may occur either

¹ Deutsche med. Woch., 1909, vol. xxxv, p. 475.

in the form of a diffuse phlegmonous infiltration, involving almost the entire wall, or may be more circumscribed, forming a distinct abscess. The phlegmonous form is about six times as frequent as the abscess form. It is very difficult, in the majority of cases of either type, to define a distinct point of origin; though it can almost always be referred to some other focus of infection or some lesion of the stomach permitting the ingress of pyogenic organisms. In four cases, the infection is supposed to have gained access through a gastric ulcer; in five cases, through a carcinomatous ulcer, and once through a gastro-enterostomy wound; once erosion is supposed to have been at the basis of the infection; and in one case, swallowed pus from a purulent stomatitis gave origin to the gastritis. In two cases, infection was transmitted from the neighborhood—in one case from a submucous esophageal abscess secondary to stricture, and in one case from a gangrenous cholecystitis. The following diseases have been looked upon as the cause of the interstitial purulent gastritis in other cases appearing in the literature—bronchiectasis, ulcerative endocarditis, endometritis, smallpox, typhoid fever, acute articular rheumatism, septicemia, and pyemia.

It is a remarkable fact that a very large percentage of patients with purulent interstitial gastritis have been alcoholics. Fifteen of Maixner's twenty-two patients were heavy drinkers. More men are affected than women. Age seems to have no influence upon the occurrence of the condition.

The symptoms usually have a rather gradual onset, and consist of loss of appetite, nausea, eructations, vomiting, fever, and pain in the region of the stomach. In three cases, prominence in the gastric region was noted. The pain becomes more and more severe, and the patient soon gives the impression of being profoundly ill. In the majority of cases, profound nervous symptoms, such as restlessness, anxiety, delirium, somnolence, convulsions, and coma, have been prominent manifestations. At times, peritonitis complicates the picture, but rather frequently the patients suddenly go into collapse and die. In a certain percentage of the patients there has been practically nothing to point to the gastric nature of the condition. Among other symptomatic features that may be of diagnostic value are the following: The pain is frequently not affected by movements of the body. Occasionally the pains radiate into the surrounding areas. Vomiting is almost always present, and is exceptionally easily induced. The vomitus is usually foul-smelling. It is frequently bile-stained or bloody. If it should contain large amounts of pus, as occasionally occurs, the diagnosis is thereby made easy; though considerable amounts of pus may be vomited in some forms of gastric catarrh, and the same phenomenon may, of course, occur with rupture of an abscess of a nearby organ into the stomach. Tumor in the gastric region has not infrequently been noted. Leukocytosis and fever of an irregular pyemic character are common symptoms.

The condition results fatally in the vast majority of cases. Münter states that but two instances of recovery have been observed. One of these was an unoperated case of abscess reported by Deininger; the other, a phlegmonous gastritis reported by Mikulicz. I quoted, in *PROGRESSIVE MEDICINE* last year, the case of recovery after operation reported by Bovée.

Achylia Gastrica. One of the important contributions of the year is that by Faber and Lange on the Pathogenesis and Etiology of Chronic Achylia Gastrica.¹ When the clinical signs of an achylia present themselves, one is always in doubt whether to attribute them to an atrophy of the gastric mucous membrane or to a purely functional disturbance. For a long time, achylia gastrica has been interpreted in the latter way, as a purely functional disturbance. It has been recognized that an achylia may result from an atrophy of mucous membrane, but when it is present, and carcinoma of the stomach and pernicious anemia can be excluded, the condition is generally looked upon as a functional disturbance. In order to establish definitely the nature of chronic achylia gastrica, Faber and Lange undertook an exhaustive clinical and pathological study of subjects of the disease.

Historically, it is of interest that gastric atrophy was observed a number of years before the clinical manifestations of an achylia had been studied. Handfield Jones described microscopically the first case of gastric atrophy in 1854. His findings were later substantiated by Fox and Fenwick. The first to describe an atrophy of the gastric mucous membrane on the basis of a chronic gastritis was Lewy, in 1887. Next, Ewald and his pupils described a case of achylia and attributed it to the gastric atrophy subsequently found at autopsy. As a result of his studies on this and other cases, Ewald concluded that, though an achylia can occur as a purely nervous affection, it usually has a basis in atrophy of the gastric mucosa. For some time subsequently, this view held sway, until Einhorn, in 1892, proposed the name achylia gastrica, and claimed that most cases of this condition, in which carcinoma and pernicious anemia can be excluded, are purely functional disorders. Subsequently, Martius, Cohnheim, and Lubarsch substantiated his claims, dividing achylia into two groups; one of them occurring in carcinoma and pernicious anemia, and caused by a gastric atrophy; the other, a purely nervous affection, to which they gave the term achylia gastrica simplex. Einhorn subsequently claimed that a long-continued, purely functional cessation of secretion, such as occurs in achylia, can lead to actual atrophy. He followed one case to autopsy, and found a diffuse gastritis with destruction of glands; but, in all probability, part of these changes, at least, were due to postmortem softening. Reviewing the literature, it is seen that, though some authorities take a different stand,

¹ *Zeitschrift f. klin. Med.*, 1908, vol. lxxvi, pp. 53 and 247.

the majority of them at the present day hold that there are two types of achylia—the one caused by an atrophy of the gastric mucosa, and associated most frequently with carcinoma or pernicious anemia, and in some instances with a chronic gastritis, while the other type they look upon as a benign functional disturbance.

In order to avoid the dangers of postmortem softening, Faber and Lange injected a 10 per cent. solution of formalin intra-abdominally immediately after death. Their first investigations concern the pathological findings in the stomachs of patients dying of progressive pernicious anemia with which an achylia was associated. They present in detail the histories and pathological findings of two such cases. Pathologically, the most prominent features in the stomachs was inflammation. There was a dense round-cell infiltration of the mucosa, especially marked near the surface, but present also, though to a lesser degree, between the glands. The glands themselves, however, were well preserved. There was in no sense a glandular atrophy. In five other cases of pernicious anemia the same pathological features were found; and the authors consequently claim that the former view that there is atrophy of the gastric mucosa in pernicious anemia must be discarded, while that of a chronic gastric inflammation must be accepted as the important feature. In their studies of cases of carcinoma of the stomach in which an achylia was present, they came to similar conclusions. The advanced changes of interstitial and parenchymatous inflammation were present, but in no sense an atrophy of the mucosa.

Twelve cases of benign chronic achylia were studied, and presented in full by the authors. These cases vary greatly as regards age, sex, symptoms, anatomical findings, and etiology. In five of them, it could be claimed that the achylia was secondary, appearing, as they did, in conjunction with other diseases, namely, diabetes mellitus, tuberculosis, gastric ulcer, nephritis, and chronic alcoholism. The others were definite cases, in which no other associated disease could be determined. Anatomically, all the cases showed marked evidences of gastric inflammation, with or without atrophy. The most prominent symptom in all the cases was, naturally, the deficient gastric secretion. In none of them was free acid present. If any peptic activity at all could be observed, it was of a very slight degree. The total acidity ranged between 0 and 20. Faber and Lange consider the latter degree of total acidity, which is not infrequently found in achylia, to be dependent upon other acids than hydrochloric acid—in all probability, phosphoric and organic acids. Motor disturbances of the stomach manifested themselves in only a few of the cases. In one case there was slightly delayed emptying of the stomach, and in another case, marked delay. In the remaining ten cases, the emptying of the stomach was slightly hastened.

The subjective symptoms were, in the majority of cases, gastric pain, nausea, and vomiting. Two of the patients were entirely free

from subjective symptoms referable to the stomach; and two of them had been free from symptoms for a number of years, during which time the achylia must have existed. Intestinal symptoms were present in ten of the twelve cases, only the two cases without symptoms having normal passages. All the remaining had either constipation or diarrhea, the two frequently alternating with each other, though the diarrhea usually predominated.

Pathologically, the gastric lesions were so varied that it is impossible to go into an exhaustive discussion of them in this place. In two of the cases a considerable degree of atrophy of the secreting mucous membrane was demonstrable. In one case, a moderate degree of atrophy was present. In the remaining cases only the most insignificant grades of atrophy could be recognized. In all twelve, however, varying degrees of gastritis were evident. The inflammatory changes affected both epithelium and connective tissue. In some cases the epithelium had undergone such marked change as to resemble a stratified squamous epithelium on the surface. An almost constant phenomenon was mytosis, though Faber and Lange did not look upon this as a positive evidence of a pathological process. The interstitial changes manifested themselves principally in round-cell infiltration, which was in some cases so extensive as to cause wide separation of some areas of glandular tissue from those normally adjacent.

Summing up the most important pathological phenomena, Faber and Lange conclude that in all their cases of achylia a gastritis was present, and consider that they are justified in looking upon the achylia as a result of the gastritis. In this connection they call attention to the fact that the degree of anatomical change cannot serve as an indication of the amount of functional disturbance resulting from it. In acute gastritis, for instance, in which the anatomical changes are much less marked than they were in their cases of achylia, the functional disturbance is often most profound.

The authors next take up the question as to how far they are justified in generalizing upon the basis of their findings. In other words, are all cases of achylia gastrica dependent upon a chronic gastritis? In answering this question, it is extremely significant that as yet there is no record of specimens of the stomach from a case of chronic achylia gastrica which were found to be normal. Many investigators have removed small pieces of the mucous membrane from the stomach by means of the stomach tube, and the studies of all of these, as well as postmortem studies, have failed to reveal what might be called a normal gastric mucosa. They have all shown evidences of gastritis. Even this, however, does not exclude the possibility of the existence of a simple functional achylia gastrica, as almost all the investigations mentioned have concerned chronic cases.

Faber and Lange themselves have studied a case in which, though

there were clinical manifestations of an achylia, the stomach showed itself, at autopsy, to be perfectly normal. This patient was a seventeen-year-old girl who died of phthisis. Though the gastric analysis showed a total acidity of 34, there was neither free hydrochloric acid nor pepsin present. On the basis of these findings, the authors feel justified in concluding that an acute achylia gastrica may exist on a purely functional basis; but they do not believe that this fact especially concerns the cases that they have been investigating, for these are all of the chronic type.

That an achylia on a purely functional basis may be present is shown, furthermore, by the so-called cases of heterochylia—cases in which there are marked variations in the gastric analysis on several consecutive occasions. However, though they believe that cases of heterochylia undoubtedly occur, the authors look upon them as rarities. In a large experience, they have met with but one such case. This was a woman, twenty-four years of age, who, in her twenty-first year, without previous symptoms, suddenly vomited a large amount of blood. After twelve weeks of rest in bed she was better, but had some gastric pain. One year later she vomited a small amount of blood, since which there has been constant gastric pain, constipation alternating now and then with diarrhea, and occasionally slime and blood in the stools. The patient was thin but not pale. Some cutaneous hyperesthesia was present in the right iliac fossa. Five consecutive Ewald test breakfasts were attended with the following results:

Date.	Amount.	Free HCl.	Total acidity.
October 24	166 c.c.	53	55
November 1	130 c.c.	60	90
November 9	270 c.c.	0	0
November 16	200 c.c.	60	80
November 27	155 c.c.	60	90

The amount of the contents was calculated according to the method of Mathieu.

It cannot be doubted that the phenomena presenting themselves in this case are dependent upon a purely functional disturbance. On the other hand, it is not of rare occurrence for the first test meal given to call forth but a very weak response, and the later ones to result in much higher degrees of acidity. This has been variously explained. By some, it is claimed to be the result of the apprehension of the subject for a procedure which is usually looked upon with considerable fear. By others, it is explained on the basis of a true gastric catarrh becoming improved through the therapeutic measures instituted after the first test meal.

Quite distinct from these cases are those in which the achylia has existed for some years, to be succeeded later by a return to normal acidity and peptic power. It would be quite irrational to conclude that such

cases are of nervous origin. Neither can there well have been an atrophy responsible for the achylia; for when there has been complete atrophy of the secreting glands, a subsequent return to normal function is impossible. It is, however, entirely possible that a chronic gastritis, responsible for the achylia, may be cured or improved to such an extent as to permit a return of function. This view becomes especially convincing when it is recalled how well the secreting glands of the stomach are preserved, even when a high degree of catarrhal gastritis exists. On account of the manifold, and often obscure, etiology of most cases of chronic gastritis, improvement to the degree of permitting a return to normal function can seldom be observed. Were cures possible in pernicious anemia, this disease would permit observations in this connection; for, as was mentioned above, pernicious anemia is almost invariably accompanied by an achylia gastrica due to a chronic gastritis. Faber and Lange have seen one case of cured pernicious anemia; but as this patient did not have an achylia, their observation is of no interest in this connection.

According to Schaumann, *bothriocephalus anemias* present the same achylia as do idiopathic pernicious anemias; and according to Moller's investigations, the same structural changes are present in the stomach as in the latter condition. Some of the cases of bothriocephalus anemia manifest a persistent achylia, even after complete cure of the anemia. Numerous cases, however, after presenting an achylia, together with all the typical symptoms of bothriocephalus anemia, do show a return of gastric secretion when the anemia is cured. Faber and Lange describe a typical instance of this type, in which, for months there was a total acidity varying between 10 and 18, no free hydrochloric acid, no pepsin, and no rennin. A year and a half after cure, there was a total acidity of 58; free hydrochloric acid, 30; pepsin, 60 per cent.; and an abundance of rennin. As a result of their observations, the authors conclude that an achylia that, after existing for some years, is succeeded by a return to normal secretion should not be attributed to a neurosis, but to a chronic gastritis, which subsequently becomes cured.

As was mentioned in the earlier part of the article, many facts have been presented in support of the view that chronic achylia gastrica is a neurosis. One of these is that an achylia may exist for years entirely without symptoms. That this offers insufficient basis for the nervous view is shown by the fact that four of Faber and Lange's patients were entirely free from gastric symptoms, and two others were without symptoms for many years; and yet at autopsy all of them presented the pathological features of a chronic gastritis, and, in fact, three of them showed a considerable degree of atrophy. The absence of an increased secretion of mucus has also been used as an argument in favor of the nervous origin of chronic achylia. Boas, in 1888, differentiated two types of chronic gastritis: one with, the other without, an increased

secretion of mucus; and the cases reported by Lange and Faber, only three of which were accompanied by an increased production of mucus, demonstrate conclusively that this phenomenon is not an essential feature of chronic gastritis. Finally, the fact has been emphasized that achylia gastrica is often accompanied by a host of nervous symptoms characteristic of neurasthenia. This argument is of little weight; for though the two conditions frequently do co-exist, it has been demonstrated that when the neurasthenia is entirely cured, the achylia frequently remains.

The apparent etiological factors concerned in the twelve cases studied are of varied nature. In some of the cases the causal factors seem clear; in others, they are very much a matter of conjecture. A severe nephritis existed in one of the cases. According to the investigations of Krakow and Biernacki, nephritis and severe degrees of chronic gastritis are not infrequently associated. This, however, does not offer conclusive evidence that nephritis is the cause of the gastritis. They may both be the effects of a common toxic agent. A second patient suffered with diabetes mellitus, another disease with which chronic gastritis and achylia gastrica seem to be frequently associated. It is a question whether the gastritis in these cases is due to the diabetes *per se* or to the increased work put upon the stomach by the diabetic diet and the associated boulimia. Two of the patients were subjects of pulmonary tuberculosis, a universally recognized cause of chronic gastritis. In another case, alcoholism was an apparent cause of the gastric disorder. In still another, the achylia apparently succeeded a chronic gastric ulcer. The authors claim to have met, with relative frequency, this association of chronic gastric ulcer with achylia. In two cases the etiology was totally obscure. In one of them the gastritis had apparently existed since childhood. In the three remaining cases the achylia was of the type that occurs not infrequently in elderly persons. It is often quite devoid of symptoms. It seems to be either dependent upon a chronic gastritis, which is part of the general process of involution, or it represents the remains of a gastritis the cause of which has long since subsided. In many of the patients, a noteworthy feature was the poor or deficient teeth. That these are of distinct etiological significance cannot be doubted; but they are probably seldom, if ever, the sole cause of an achylia gastrica.

The authors conclude with the statement that they feel justified in asserting, on the basis of their observations, that achylia gastrica, unless it is a distinctly temporary phenomenon, is dependent upon chronic gastritis.

Congenital Pyloric Stenosis. Congenital stenosis of the pylorus has attracted much attention during recent years among pediatricists. It has, however, received little attention as a cause of pyloric stenosis in the adult, though its possible importance in this connection has

repeatedly been noted. Russell¹ believes that it is not an infrequent cause of pyloric stenosis in the adult, and reports several cases that he considers to be instances of this condition. Attention was first called to the possibility of congenital stenosis of the pylorus being the cause of gastric symptoms in the adult, by Landerer, in 1879. He supported his claims by 10 cases that he thought were instances of congenital pyloric stenosis. In 1885 Maier reported 31 cases in which he had found a pyloric stenosis that he believed to be congenital. His observations were made at postmortem examinations after his attention had been drawn to the subject by a striking example of the condition occurring in one of his cases. The age of the patients in Landerer's and Maier's series varied between twelve and seventy-five years. Maier, as the result of his observations, divided his cases into two groups, a simple form and a combined form. The second group contained the cases in which, in addition to stenosis, there was thickening of the pylorus. With regard to the first group, in which narrowing was present without other change at the pylorus, he did not think that there was reasonable room for doubt that they were congenital. Those in which there was pyloric thickening he carefully examined and analyzed, finally concluding that they also were congenital. Maylard, in 1903, published a paper on congenital stenosis of the pylorus in the adult, and reported seven cases that he thought illustrative of the condition.

On the basis of the cases that he studied, Russell describes the symptoms as those of benign pyloric stenosis, coming on usually in early or middle adult life. Not infrequently, the patients suffered with similar symptoms in early life, at which time they learned to have sufficient discretion in regard to diet to keep them relatively free from symptoms for some years afterward. Depending upon the care that these patients exercise in diet and the condition of their general health, they may continue to remain free from symptoms during a shorter or longer period of their subsequent life. There is usually a certain amount of periodicity in the symptoms, which consist especially of vomiting shortly after taking food, gastric pain, and a sense of epigastric fulness.

On examination, the stomach is found to be greatly dilated. There is visible peristalsis, and usually hyperacidity is found. The conditions from which it must be differentiated, according to Russell, are ulcer of the stomach and cicatricial stenosis of the pylorus. The three patients whose histories Russell quotes were operated on, gastro-enterostomy being performed, all three patients making a satisfactory recovery.

Maylard,² writing on the same subject, reports 12 cases of congenital stenosis of the pylorus in the adult, which he collected since his original report, which included 7 cases. The results of treatment by performing a gastro-enterostomy in Maylard's cases was not especially encouraging. Of the 7 cases that formed the basis of his first

¹ British Medical Journal, 1908, vol. ii, p. 68.

² Ibid., p. 71.

communication, particulars could be obtained of only 6. Of these, one, after an interval of five years, was again suffering from gastric symptoms; two, after six years, had remained considerably improved, but not cured; one died at the end of two years, of some cardiac trouble, but the stomach symptoms had been quite relieved; two, after an interval of five years, were quite well. Maylard's conclusions are as follows:

1. That there exists an abnormal condition of the pyloric aperture, of probably congenital origin, which consists in an undue narrowing of the orifice, varying anywhere between 2 and 10 or 12 mm.

2. That the condition is more frequently met with in women than in men, and that the age at which the symptoms first appear depends upon the narrowness of the aperture and the general physical or constitutional condition of the patient.

3. That the narrowing leads to a more or less chronic condition of indigestion, manifested in various forms, and often mistaken for chronic ulceration or chronic gastric catarrh; that in the early stages relief is afforded by careful and strict attention to diet, but that any attempt to return to normal feeding causes a recrudescence of indigestion. The attacks of gastric discomfort are at first separated by considerable intervals, but these lessen in length as time goes on.

4. That when the patient is advanced in life and shows marked general debility, operation will prove of doubtful value.

5. That pyloroplasty or Finney's operation, preferably the former, should be practised when feasible.

Since, in all probability, all cases of congenital stenosis of the pylorus do not die in infancy, it is not improbable that some such patients may live to adult life, and only then present symptoms of the condition. It seems not improbable that the cases described by Maier as being of the simple form, may be instances of this condition. In regard to the other cases, however, one would be justified in entertaining grave doubts that the condition is congenital. Most of the patients suffering with this condition have hyperacidity; and though it is not improbable that this hyperacidity may be a result of the pyloric stenosis, it can very rationally be thought to be the primary condition so far as the stenosis is concerned, and to be itself dependent upon other organic or upon neurotic conditions. It is thoroughly established that hyperacid gastric contents, by causing the pylorus to contract when it comes in contact with the duodenal mucous membrane, can induce pyloric spasm, which, if sufficiently long continued, can undoubtedly cause hypertrophy of the musculature of the pylorus and consequent stenosis.

We are no more justified in considering cases of pyloric stenosis of otherwise unexplained etiology to be congenital, than we are in advancing the same explanation for cardiospasm cases. The latter is not done, and the tendency to consider many cases of pyloric stenosis con-

genital has no better basis than the fact that congenital stenosis sometimes does occur.

If an advanced degree of stenosis has resulted, treatment, in all probability, does not differ, whether the condition be congenital or acquired, though in either case medical treatment tending to decrease pyloric spasm and reduce the gastric acidity should be tried before resorting to surgical interference.

Acute Dilatation of the Stomach. I reported last year, in some detail, on acute dilatation of the stomach, especially that form subsequent to operation. The feature of especial interest in these cases is the cause of the dilatation. It was first held that obstruction of the duodenum by the root of the mesentery and the mesenteric vessels was the primary cause of the dilatation. Lately, the view has been presented by several writers that the dilatation of the stomach is primary, dependent, in all probability, upon some form of gastric paralysis; and that the apparent obstruction of the duodenum by the root of the mesentery is an incidental feature of little importance. If the duodenal obstruction is primary, then the same symptoms should be presented in other cases of intestinal obstruction located near the stomach. Such cases are by no means common. By a peculiar coincidence, Axhausen¹ has recently had two cases in which intestinal obstruction did occur in that region, and he presents them as a contribution to the pathogenesis of acute postoperative dilatation of the stomach.

The first case was that of a laborer, aged forty-one years, who had been suffering for twelve years with gastric symptoms. The history and physical signs were typical of a benign stenosis of the pylorus, secondary to gastric ulcer. This diagnosis was substantiated at operation, and a posterior gastro-enterostomy was performed. For the first ten days after operation the course was uneventful. On the eleventh day after operation the patient complained of fulness in the gastric region, associated with colicky pains. The same evening he commenced to vomit. From that time on he vomited everything that was taken into the stomach, and, in addition, large quantities of mucus and bile. In spite of gastric lavage, the symptoms continued; and on the fourth day after the onset of these symptoms a second laparotomy was performed. The cause of the symptoms was readily found in a band-like adhesion, 1 to 2 cm. in width, completely obstructing the small intestine just below the site of the anastomosis. The distal portion of the intestines was collapsed, the proximal portion being greatly distended. As the band was sectioned, the contents readily passed from the proximal into the distal portion of the intestine. The patient made an uneventful recovery; and three weeks after the second operation, left the hospital, entirely free from symptoms, and having gained almost ten pounds.

¹ Deutsche med. Woch., 1909, p. 145.

The second patient was a mason, aged forty-one years, who was sent to the surgical clinic for operation on account of an ulcer of the stomach, with symptoms of pyloric stenosis. The diagnosis was confirmed at operation, and a gastro-enterostomy was performed. The course subsequent to operation was at first uneventful. On the eleventh day, however, the patient commenced to vomit, and presented practically the same symptoms as had the previous case. Lavage was here also without benefit; and five days subsequent to the commencement of the symptoms a second operation was performed. About 15 cm. below the point of anastomosis an apparently complete stenosis of the intestine was found, evidently tuberculous. Twelve similar points of stenosis were found within the course of the next two meters of the small intestine. The portion of intestine above the uppermost stenosis was distended; the portion below this location collapsed. The diseased portion of the intestine was removed, together with the neighboring mesenteric lymph nodes. The patient made a satisfactory recovery, after a subsequent third operation for a mild localized peritonitis. A subsequent report indicates that the patient remains in good health.

In both the above mentioned cases there was an undoubted complete obstruction of the intestine, not far from the pylorus. If acute dilatation of the stomach is dependent upon obstruction of the duodenum, there is every reason to look for the same symptoms and signs in the two instances cited above. In neither of them, however, were they present. There was not the vomiting of enormous amounts of fluid, as is observed in acute gastric dilatation; and there was not the profound constitutional disturbance that is observed in these cases. After vomiting, the patients both said that they felt fairly comfortable, except for thirst. The cardiac action and general condition remained good. Above all, at operation there was no enormous distention of the stomach such as occurs in acute dilatation of that organ. Axhausen believes that these cases contribute very materially to the view that acute postoperative dilatation is not dependent upon duodenal obstruction.

Gastric Tetany. The interesting condition known as gastric tetany forms the subject of a contribution by Brown and Engelbach.¹ They report a case of a woman, aged forty-eight years, who had been suffering for a year and a half with gaseous eructations and occasional vomiting. Three months after the onset of these symptoms she had her first spasm, affecting the extremities and trunk, but not the larynx. This spasm was characterized by the typical folding and clenching of the hands, and flexion of the toes. It lasted for several hours, at the end of which the patient vomited. For the following day she was greatly depressed. The spasms gradually increased in frequency. Since she had learned to associate the attacks with the taking of food, her physician advised

¹ Surgery, Gynecology, and Obstetrics, 1908, vol. vii, p. 558.

lavage, which she practised on herself as frequently as ten times a day. When the patient subsequently came under Brown and Engelbach's observation, she was found to present the signs and symptoms characteristic of a benign stenosis of the pylorus—a diagnosis that was substantiated at operation. Gastro-enterostomy was performed, and since then the patient has been entirely free from both gastric and tetanic symptoms.

Gastric tetany has been thought to be a phenomenon attending only dilatation of the stomach. Brown and Engelbach conclude from their personal observation and a review of the literature that dilatation is not the actual etiological factor, but rather that stenosis of the pylorus is. Dilatation may occur as a consequence of the stenosis; but if it does, it is, according to their opinion, a purely incidental feature. In the cases reported in the literature of the subject various types of both benign and malignant pyloric stenosis have been described.

Various hypotheses have been proposed to explain the obscure relationship between the gastric affection and the tetanic convulsions. Kussmaul attributed the convulsions to loss of water by secretion into the dilated stomach, and the consequent desiccation of the tissues. This view has also been employed to explain those cases of tetany associated with chronic diarrhea. Miller and Riegel have proposed and supported the view that the tetany is due to reflex irritation. Neither of these two views seems tenable at the present day. Bouchard looks upon auto-intoxication as responsible for the tetany. Some of the French observers have isolated toxic substances from the stomach contents of patients suffering with gastric tetany, and have subsequently produced more or less typical attacks of tetanic convulsions by injecting them into animals. However, other experimenters have isolated substances having the same effect from persons not suffering with tetany. We thus see that no satisfactory explanation has been offered for the tetanic outbreaks.

The symptoms may be divided into the purely gastric and the tetanic symptoms. The gastric symptoms will vary according to the character and degree of stenosis and the influence that this has upon gastric motility and secretion. The tetanic symptoms are frequently preceded by symptoms referable to the stomach, such as fulness, distention, nausea, pain, and at times regurgitation or vomiting. The onset of the convulsion is usually sudden, beginning with sensory disturbances in the hands and feet, which are soon followed by spasms of the distal flexor muscles, extending rapidly to the larger muscles of the extremities and body.

When the convulsion is very slight, the symptoms may consist of sensations of numbness or formication, associated with slight tonic contractions located especially in the hands and face. These slight symptoms may be present for a long time without developing into the

classical convulsions, or they may immediately precede a typical attack of a generalized convulsion. Temporary disturbances of the intellect, loss of memory, and disturbances of vision and speech have been described.

Trousseau distinguishes three different degrees of tetany, according to the extent of muscular involvement. (1) A mild type in which only the muscles of the extremities are affected; (2) a type of moderate severity, in which, beside the muscles of the extremities, those of the trunk, abdomen, and face are involved; and (3) a grave type in which the muscles of the larynx, pharynx, and tongue are included in the convulsions.

The especially characteristic features of tetany are the occurrence of Trousseau's, Chvostek's, and Erb's signs in the periods between the attacks. Trousseau's phenomenon consists of a characteristic contracture in the hand and forearm on constricting the upper arm. Chvostek's sign consists in the contraction of the muscles on one side of the face on tapping over the branches of the facial nerve. Erb's phenomenon is the increased galvanic and faradic irritability of all the motor nerves except the facial.

The prognosis of gastric tetany has always been considered very grave. According to Brown and Engelbach, the mortality under medical treatment has been 88 per cent.; but since the introduction of surgical treatment, it has been reduced to 37.5 per cent. The prognosis of the individual cases necessarily depends upon the nature of the lesion producing the obstruction of the pylorus. Since, however, according to the authors, the majority of cases are due to benign lesions of the pylorus, surgical treatment presents a means of greatly reducing this percentage of mortality. If surgical treatment cannot be employed, medical treatment consists of frequent lavage, the administration of easily digested food, and the employment of gastric and intestinal antiseptics.

Some interesting observations on a case of gastric tetany are made by Kinnicutt.¹ The patient was a male, aged thirty-three years, who was admitted to the Presbyterian Hospital in tetanic convulsions involving all four extremities, the face, and portions of the trunk. There were evident manifestations of pyloric stenosis and gastric dilatation. There was a history of having been treated for duodenal ulcers some years before the present illness. The patient was too ill to permit of an operation. Gastric lavage and hypodermoclysis had little effect in controlling the spasms, and consequently a resort was had to therapeutic measures which were based upon recent studies in the pathology and metabolism of tetany. The administration of an extract of the parathyroid glands was entirely without effect. A very striking result, however, attended the intravenous administration of

¹ American Journal of the Medical Sciences, 1909, No. 448, p. 1.

calcium in the form of calcium lactate. At once there was a decrease in the spasm; and after subsequent administrations, the tetanic symptoms practically disappeared completely. Later, the patient succumbed to the effects of inanition and cardiac weakness. The postmortem examination showed duodenal ulcer, with pyloric kinking, and a hypertrophied and dilated stomach.

Gastric Ulcer. Studies on Autodigestion. Very suggestive experiments bearing upon the digestion of living tissues by the gastric juice were performed by Katzenstein.¹ The first experiment consisted in implanting a loop of jejunum, with its blood supply well retained, into the animal's own stomach. On the second and third days after the operation the animal seemed well and ate heartily. Three days later, however, it appeared sick; and it died of inanition eight days after the operation. At autopsy the entire portion of the jejunum which had been introduced into the stomach was found completely digested. Repetitions of this experiment were attended by the same results, except that the animals lived until they were killed.

The second operation consisted in introducing one end of the spleen into the animal's own stomach. One of the animals so operated upon was killed twelve days after the operation; the other, three months after the operation. In both cases the entire portion of the spleen that had been introduced into the stomach, approximately one-third of the total organ, had completely disappeared, having been digested and absorbed.

In the third experiment a gastro-enterostomy was performed in such a way as to prevent the flow of alkaline intestinal juice into the stomach. The portion of the intestine in contact with the stomach and subjected to the action of the gastric juice had undergone partial digestion, the wall, in some instances, being reduced to paper-like thinness. This operation was interesting in view of some former experiments of Katzenstein, which had as their object the determination of the reasons for the failure of digestion of the jejunum after gastrojejunostomy. His conclusion as the result of those experiments was that the failure of digestion of the jejunum, as well as the improvement in the gastric symptoms, was due to the reduction of the peptic activity of the gastric contents by the alkaline intestinal juices.

The fourth experiment consisted in introducing a portion of the duodenum, with its nutritional vessels preserved, into the animal's own stomach. Fourteen days after operation the dog was killed, and the duodenum was found to be wholly unaltered by the gastric secretion.

Finally, a portion of the stomach was inverted in such a way as to be continuously bathed in gastric secretion, and as to act practically like a foreign body in the stomach. Eleven days after operation the inverted portion was found to be totally unaltered.

¹ Berliner klin. Woch., 1908, vol. ii, p. 1749.

The results of these experiments may be expressed as follows:

1. Living tissue, normally nourished, is digested by the gastric juice in the stomach of the same animal.

2. Tissues that produce gastric juice or are normally bathed in gastric juice, when subjected to the same conditions, are not affected by the gastric juice.

The interesting question of why the stomach does not digest itself has found many answers. The principal hypotheses are the following:

1. The protective action of the mucus. This was first proposed by Claude Bernard and accepted by Harley and Schiff. It is, without doubt, correct that the mucus possesses a certain limited amount of protective influence against digestion. Danilewsky has recently been able to extract an antiferment from the gastric mucus by means of diluted hydrochloric acid. An "antiferment" of this kind, however, cannot yet be looked upon as being at all specific either biologically or chemically. There is a spurious dignity about such terms. At present they really mean very little in many of the instances in which they have been used, except to indicate phenomena of whose nature we are largely ignorant, and which may be of much or little importance, we do not know which. Giving impressive names to them is always likely to make us have an inflated idea of their importance.

2. A protective action of the surface epithelium is a second hypothesis, which was also presented by Claude Bernard. Both these hypotheses are probably, to a certain limited extent, correct.

3. According to Pavy, the blood circulating in the capillaries of the gastric mucosa, giving up its chlorine to the formation of hydrochloric acid, becomes greatly increased in alkalinity, and thus protects the stomach against digestion. That this hypothesis is faulty is clearly shown by the fact that the pancreas, whose ferments are active only in an alkaline medium, does not undergo digestion. There is no doubt that the blood has some protective action against autodigestion; but this, Katzenstein considers, is through its antitryptic action, and not by reason of any alterations of its chemical reaction.

4. According to the vitalistic theory, originated by John Hunter, all living tissue is able to withstand the digestion of gastric juice. Mattthes, who is an ardent supporter of the Hunterian view, thought to lend support to this hypothesis by demonstrating that the living stomach wall, deprived of its mucosa, is not digested by the gastric juice. The well-known experiment of Claude Bernard, in which it was demonstrated that the leg of a living frog, when introduced into the gastric fistula of a dog, became completely digested, he explains by the hypothesis that the hydrochloric acid of the gastric juice kills the living cells, which are then readily subject to the digestive action of the gastric juice. He believes that this view is supported by the fact that when hippuric acid is substituted for the hydrochloric acid of the gastric juice, this digestion does

not take place. Katzenstein believes that the latter experiment proves only that pepsin is active in the presence of hydrochloric acid, and not in the presence of hippuric acid; and he does not believe that it in any wise supports the vitalistic theory. There is no doubt that living tissue is more resistant to digestion than is dead tissue, on account, he believes, of the circulation of the antipepsin-containing blood, and on account of the general metabolic processes occurring in the living cells. That, however, the resistance of certain tissues to the processes of digestion is not dependent entirely upon phenomena associated with the life of these tissues, but that they possess some property retained even after death, is shown by some experiments of Katzenstein.

When a small portion of the gastric mucosa is introduced into an active gastric juice, this juice will not digest the albumin in a Mett tube, while the albumin, in the absence of the gastric mucosa, becomes readily digested. Since it might be thought that the gastric mucosa united with the hydrochloric acid of the gastric contents, thus preventing the activity of the pepsin, Katzenstein performed the following interesting experiment:

Into each of four test tubes, a quantity of active gastric juice was placed. In the first tube was placed also a Mett tube; in the second, a Mett tube with a small portion of jejunal mucous membrane; in the third, a Mett tube and a portion of mucous membrane of the large intestine; and in the fourth, a Mett tube and a small portion of gastric mucous membrane. In the first two tubes the albumin was entirely digested, in the third it was almost entirely digested, and in the fourth it was almost entirely undigested. According to Katzenstein's view, this experiment conclusively demonstrates that the resistance of the stomach to autodigestion is not dependent upon the life of the cells, but upon some property of the cells or some substance contained in them that is retained after their death.

Somewhat similar phenomena have been observed in the field of zoölogy. Weinland has demonstrated that the larvæ of *teniæ*, which are not digested in the stomach, possesses a property that inhibits the digestion of fibrin by pepsin. He has been able to demonstrate this not only in the macerated bodies of the parasites, but also in an alcoholic extract of these.

Katzenstein believes that his demonstration of protective properties or antiferments possessed by some organs, in contrast to others, may throw some light upon the etiology of gastric ulcer. The most characteristic feature of gastric ulcer is its lack of tendency to healing, and he thinks that this may possibly be dependent upon the deficiency of the stomach in these antiferments. If this is true, the administration of antipepsins should contribute to the healing of gastric ulcer. Working on this basis, the author claims to have had some most encouraging results, which will be published in the near future.

This is very interesting work, but until some convincing results are reported in considerable numbers, we may be permitted to be skeptical as to its immediate practical use. Critically looked at, these results are in many respects confirmatory of previous less complete knowledge rather than themselves essentially original. They are certainly widely separated from a real comprehension of and a real treatment of gastric ulcer. Again, I would say that the term antiferment is almost synonymous with ignorance.

TREATMENT OF ULCER. Though the future will perhaps reveal some specific form of treatment for gastric ulcer, such as that suggested by Katzenstein, we are still confined to the medical and surgical treatment of this condition. One of the most essential parts of the medical treatment is, naturally, the diet. As v. Tabora¹ says, the dietetic treatment alone, when properly carried out, is sufficient to induce cure in the majority of cases. As a matter of fact, some cases show a tendency to heal, even without dietetic treatment, as is shown by the occasional discovery at autopsy of the scars of gastric ulcers, when during life there had been no symptoms suggestive of the existence of such a lesion. According to v. Tabora, this tendency to healing manifested by some ulcers is especially noticeable after extensive hemorrhage—a fact that, he thinks, has not received sufficient recognition in medical literature.

In marked contrast to the cases that manifest a spontaneous tendency to healing or are readily cured, or, at least, made latent, by appropriate dietetic treatment, are those in which continuous hypersecretion and motor insufficiency are associated with the ulcer. Here, in spite of the most rigid dietetic measures, the patient is seldom relieved of the symptoms; and even additional measures, such as the administration of bismuth, oil, or silver nitrate, or lavage with chloride of iron solution, seldom lead to satisfactory results. When, finally, medical treatment has been valueless in these patients, they are usually referred to the surgeon. In many of these patients, however, even surgical treatment is discouraging. The operation that is usually performed is gastro-enterostomy; and not infrequently, even after this procedure, the hypersecretion and, consequently, the ulcer remain. Von Tabora has repeatedly seen cases of this type in which there has resulted a condition analogous to pylorospasm at the site of the gastro-enterostomy, resulting from the continuous hypersecretion. In addition to these disquieting features, there is the constant fear of the subsequent development of a jejunal ulcer. Under these circumstances any means that might induce cure in such cases without operation should be heartily welcomed. Von Tabora thinks that we possess such a means in the systematic administration of *atropine*.

Of the various pharmacological properties of atropine, three deserve

¹ Münch. med. Woch., 1908, vol. ii, p. 1992.

especial consideration in this connection. The most important of these is its influence in decreasing the secretion of hydrochloric acid. Of not much less importance is its property of inhibiting non-striated muscle, and consequently reducing the spasmodic contractions of the gastric musculature. The third is its slight narcotic property. Undoubtedly, one of the most potent factors in preventing the healing of a gastric ulcer is the continuous secretion of a hyperacid gastric juice; and anything that can reduce this secretion will, naturally, have a beneficial influence upon the ulcer. If pylorospasm is also present in consequence of this hypersecretion, reduction of the latter will, naturally, be attended with decrease in the former. If, however, the pylorospasm is due to the local irritation of an ulcer located at the pylorus, then it is probably the influence of atropine upon spasm of non-striated muscle that is especially potent in relieving the spasm. As undoubtedly a great part of the pain of gastric ulcer is due either to pyloric spasm or to the irritant action of the hyperacid gastric juice on the ulcerated surface, the two properties mentioned tend to the reduction of the pain. The third property mentioned, the slight narcotic effect of atropine, is also efficient in reducing the pain, as well as other sensations, such as hunger, thirst, and the gnawing sensation so frequently experienced by patients with gastric ulcer.

Even before atropine was known to possess the property of reducing the secretion of acid, belladonna was used in gastric diseases, especially for its narcotic effect, and within the last ten years atropine has here and there been occasionally used in the treatment of ulcer, but it has never been methodically employed in this connection. Because of the exhaustive experimental studies of Riegel on the effect of atropine in reducing the secretion of hydrochloric acid, von Tabora has used it extensively in the treatment of continuous hypersecretion, and has learned to look upon it as a most valuable and trustworthy means of treating this condition, a view to which I can give hearty adherence so far as its being valuable is concerned, though I cannot call it trustworthy, as many cases do not seem to be benefited. It was as the result of his experience with it in this condition that he first employed it in gastric ulcer associated with hypersecretion and motor insufficiency. The results that he obtained were in all cases good, and in many surprisingly brilliant.

The cases in which von Tabora has used atropine, and upon which his results are based, do not include those uncomplicated cases in which cure usually results from the employment of the ordinary dietetic measures alone. He has chosen only those cases in which others had failed with dietetic treatment, and had, consequently, recommended surgical intervention; or in which he himself had failed to attain the desired results with dietetic and other medicinal measures. It is true that the cases treated with atropine were also put upon the usual dietetic regime; but von Tabora thinks that he is fully justified in attributing the results

to atropine, and not to the dietetic measures, for all these patients belonged to that type which he had learned to know could almost never be cured by dietetic measures alone.

The atropine is administered hypodermically, in quantities of 1 mg. ($\frac{1}{65}$ gr.) morning and evening. Von Tabora has frequently given as much as 3 mg. ($\frac{1}{20}$ gr.) a day, and would not hesitate to exceed even this dose, if it appeared necessary. This treatment is continued for from four to eight to ten weeks, the patient being kept in bed during this period. He has found the injections to be, without exception, well borne. According to the author, it is surprising how insignificant the associated symptoms of atropine administration were. The latter consisted only of a sensation of dryness in the mouth and throat, and occasionally paralysis of accommodation, which made it impossible for the patient to read. Occasionally he had the latter corrected by the use of appropriate lenses. None of his patients complained of headache or dizziness.

The dietetic treatment consisted in a preliminary period of total abstinence for several days. Liquids were administered during this period, either per rectum or subcutaneously. Von Tabora was surprised to find how frequently the patients complained of less discomfort from the subcutaneous administration of liquid than from its rectal administration, a statement that is certainly surprising and one that has not been in accordance with my experience. After this preliminary starvation period the patient was given hourly, first a teaspoonful, then 50 c.c., then 100 c.c., and later 200 c.c., of milk, to which one-third the quantity of cream had been added. The increase in the amount of the milk-cream mixture was so regulated that at the end of about two weeks from the commencement of the cure, 200 c.c. of milk were taken hourly. This milk-cream diet was continued for at least four weeks, when soft food and eggs were carefully added. Meat is not permitted for two months, and then only in a finely divided form. Such a diet constitutes what might be called a slightly modified Leube diet, to which von Tabora returned after numerous unpleasant experiences with the Lenhartz treatment. All the patients put upon this diet and receiving atropine gained in weight during the treatment.

The subjective symptoms permanently disappeared in most of the cases after the first day of treatment. In the majority of the patients the hydrochloric acid values of the stomach contents were much lower after the cure than before it; and in those cases in which it was possible to see the patient some time after the completion of the cure, it had remained low. The hypersecretion was completely abolished in some of the cases, and in all of them materially reduced. Similarly, the motor function of the stomach became greatly improved. In several cases, the pyloric spasm had been of such a degree as to present palpatory findings suggestive of a pyloric tumor. This phenomenon entirely disappeared after treatment. In none of the cases in von Tabora's series did

he fail to benefit the patient. The improvement in individual cases naturally depends upon the characteristics of the case. If, for instance, retention is due entirely to hypersecretion and pylorospasm, appropriate treatment should cause its complete disappearance. If, however, the stenosis is due to scar formation, *restitutio ad integrum* is, naturally, impossible. Even the latter condition, however, von Tabora has found to be greatly improved by a mere reduction in the hypersecretion. This form of treatment naturally does not exclude the possibility of recurrence, and the author had several relapses. It is interesting that one patient having a recurrence and having been unsuccessfully treated in another clinic with bismuth, came back to von Tabora with a request that the injections be again used.

It should be noted that individuals respond differently to the use of atropine in respect to the alterations in secretion and motility of the stomach. In previous experiments von Tabora found that, whereas in some patients the injection of 1 mg. ($\frac{1}{6.5}$ gr.) of atropine was sufficient to reduce greatly the acidity consequent upon a test breakfast, other patients required as much as $1\frac{1}{2}$ to $2\frac{1}{2}$ mg. ($\frac{1}{40}$ - $\frac{1}{25}$ gr.) before any reduction was apparent. It might be well, therefore, before instituting an atropine cure, to determine by this means the amount of atropine necessary for the patient in order to cause a sufficient reduction in the hydrochloric acid. There is some danger, however, from the frequent passage of the stomach tube necessary to such a procedure; and von Tabora thinks that the vast majority of patients will do well on from 2 to 3 mg. a day. The author remarks that it is rather surprising that the nerves do not lose their sensitiveness to atropine after its long-continued administration. The sensitiveness rather seems to increase, and he has been able to effect a complete anacidity by its long-continued administration.

The benefit of the atropine method is undoubtedly to be found in the complete rest that it affords the stomach, such as is possible by no other form of treatment. In spite of this, however, the author has used it, and recommends its use, only in that class of ulcer patients that, experience has taught, does not become cured by the other forms of treatment. This seems wise, whatever its actual value when used. The unpleasant collateral effects of atropine make it usually a disagreeable drug to use in large doses for any great length of time, a fact in itself sufficient to make it undesirable when less unpleasant measures suffice.

Gastric Carcinoma. Two articles by Kuttner on Carcinoma of the Stomach are well worth serious consideration. One is on the Diagnosis and Treatment of Inoperable Carcinoma of the Stomach¹—the other, on the Operative Treatment of Carcinoma of the Stomach, its Indications and Prognosis.² Though much of the subject matter presented is not

¹ Deutsch. med. Woch., 1909, vol. xxxv, p. 49.

² Ibid., p. 185.

new, the views of one who has Kuttner's experience and judgment are well worth quoting somewhat extensively and in detail.

SYMPTOMATOLOGY. As the author says, easy as is the diagnosis of carcinoma of the stomach in a large percentage of cases, just so difficult is it in cases that do not present typical symptoms. An early diagnosis is of so much importance from the operative standpoint of the disease that it is not sufficient for the specialist alone to be versed in those features which indicate its existence. It is just as important that the general practitioner, though he may not be able to make a positive diagnosis, should have sufficient knowledge of the subject to recognize the possibility of a carcinoma in a sufficiently early stage to permit of a radical cure. Of importance for this early recognition is a knowledge of how gastric carcinoma first manifests itself. Kuttner thinks, as von Tabora expressed himself, that when a person presents symptoms of a progressive gastric disorder, after having had a good digestion for fifty or sixty years, suspicion of the existence of a carcinoma of the stomach can well be entertained. On account of the tendency of the laity to ascribe all diseases to some especial cause, they will not infrequently attribute the symptoms with which they present themselves to some error in diet or other circumstance that may throw the physician off his guard. This point is certainly wisely emphasized and is not sufficiently appreciated. Severe and progressive gastric symptoms, even in persons considerably more than fifty, should awaken suspicion, especially when the cause is not apparent. Not infrequently, indeed, the symptoms and even the gastric contents suggest other diseases, particularly ulcer, and give one an undue sense of security against carcinoma. The only proper attitude is to be always alert to find carcinoma in any case with marked or persistent symptoms, in those who have reached middle life, if there is not clearly some other cause.

Occasionally the first indication of the existence of a carcinoma of the stomach manifests itself in hematemesis or bloody stools. In Kuttner's own observations this has occurred but three times in a very large number of cases of gastric carcinoma. It is not always, however, that the condition begins so acutely. Often enough, it appears as a slowly progressive disease with general dyspeptic symptoms simulating a gastric catarrh. This, however, does not warrant the suspicion that a malignant neoplasm often establishes itself on the basis of a chronic catarrh, an *achylia gastrica*. In hundreds of cases that have come under his own observation, Kuttner has but four times seen an *achylia gastrica* precede carcinoma. Much more frequently the development of carcinoma is preceded, either immediately or after an interval of some years, by symptoms suggestive of ulcer of the stomach.

In addition to the usual sudden commencement of the disease, another symptom of great importance is the loss of appetite, which not infrequently manifests itself in an actual disgust for certain sorts of food,

especially meat. This is by no means a late symptom, as is frequently thought, but one that often enough occurs in the very earliest stages of the disease. On the other hand, it must be emphasized that a good appetite by no means excludes the possibility of the existence of a carcinoma. This is the case especially in those instances in which the motor powers of the stomach are well preserved. These two symptoms, a sudden onset and loss of appetite, are, of course, especially suggestive when other predisposing factors are present. The most important of these is advanced age. In this connection, Kuttner emphasizes, however, that a diagnosis of carcinoma of the stomach must not be discarded purely on the basis of the age; for he has not infrequently seen gastric carcinoma pass unrecognized simply because it occurred in a young person.

Other factors usually looked upon as predisposing to carcinoma of the stomach are heredity, trauma, and ulcer. Ewald, in 178 cases, found 6.7 per cent. to be hereditary. However, the significance of this must be considered with some reserve; when we consider how frequent gastric carcinoma is, it is not unusual that certain cases should occur in the same family, even though no predisposition be transmitted. Various writers have attributed considerable etiological importance to trauma in the development of carcinoma of the stomach, and there is no doubt that cases do occur in which trauma has preceded the manifestations of carcinoma. In spite of this, Kuttner believes that the significance of this trauma is of only secondary importance; in other words, that it may hasten the development of a tumor that was previously latent.

According to the views of most authorities, ulcer of the stomach is an important predisposing factor in the development of carcinoma. As a matter of fact, not infrequently patients with carcinoma of the stomach have previously been sufferers with gastric ulcer. It has frequently been claimed that the worry and suffering and psychological depression incident to the ulcer have been the important factors in the subsequent development of the carcinoma. The arguments presented to support this view are, however, by no means convincing. Whatever the significance of the previous existence of an ulcer may be, one should always be especially suspicious of the possible occurrence of a carcinoma when, with a history of previous ulcer, the patient presents himself with signs of decided anemia or beginning cachexia. On the other hand, it must not be thought that either cachexia or anemia is absolutely essential to a diagnosis of carcinoma. Kuttner has seen three patients suffering with gastric carcinoma who followed their arduous occupations until within a few days of their death.

Edema, usually manifesting itself about the ankles, is a symptom of comparatively little diagnostic importance; because it occurs so late in the disease that the condition can be diagnosticated from other more

important phenomena by the time it presents itself. A symptom that Kuttner thinks possesses some diagnostic importance is stubborn itching of the skin. Small skin angiomas he does not think of much significance. This is surely correct. They are very common in elderly persons who have no suspicion of carcinoma. Occasionally enlargement of the left supraclavicular lymph nodes is indicative of an occult gastric carcinoma. This is, however, by no means pathognomonic, and it is also absent in most instances. Enlargement of the umbilical lymph nodes is a not infrequent symptom, but it occurs usually only late in the disease.

In addition to the above-mentioned symptoms, which are only more or less suggestive of carcinoma of the stomach, are the following ones, upon which more value for the diagnosis can be laid: The regurgitation of foul-smelling material and the vomiting of coffee-ground contents are both significant. At times, on the introduction of the stomach tube, one obtains so fetid an odor that, almost on the basis of this alone, can a diagnosis of carcinoma be established. One should never neglect, after removing the stomach tube to smell the lower end for the odor of any adherent particles that may be present. The vomiting of coffee-ground-like material, though not a pathognomonic sign, is one that can be looked upon as extremely suggestive of carcinoma. Vomiting alone, though not a constant symptom, is a very frequent one. It occurs most frequently when the tumor is situated at one of the orifices, though a very considerable degree of stenosis of the pylorus may be present without vomiting. Pain is frequently absent throughout the entire course of the disease; and even when present is of but doubtful value in the diagnosis.

Of more importance than any of the symptoms thus far presented is the occurrence of a tumor: provided that it can be felt; that it can be proved to take its origin from the stomach, and that it is malignant. As a matter of fact, the tumor is not palpable in a very large percentage of cases. Carcinoma of the cardia can almost never be palpated, and then only if it reaches enormous proportions. Carcinoma of the lesser curvature is subject to palpation only when it grows toward the pylorus and is not covered by the liver and the left costal margin. A tumor of the lesser curvature is most likely to be palpated just under the left costal margin when the patient lies on the right side and takes deep inspirations. In differentiation from tumors of the liver, carcinoma of the lesser curvature is susceptible of expiratory fixation; that is, if it can be grasped at the height of inspiration it can be held down during expiration—provided, of course, that it is not adherent to the liver. Even in many cases of carcinoma of the pylorus, the tumor cannot be felt because of its lying under the liver; and both the diffuse carcinomatous infiltration of the stomach and carcinomas situated on the posterior wall are seldom to be palpated.

Palpation of carcinoma of the stomach is frequently made especially

difficult by the presence of ascites or abdominal distention, or by extremely fat or tense abdominal walls. In order to overcome the resistance of tense abdominal muscles, it is well to palpate the patient in a warm bath or, according to the recommendation of Skutsch, to request the patient himself to put his own hand on the abdomen and press the abdominal wall in. These methods are much more to be recommended than the administration of an anesthetic.

In order to determine if a questionable tumor belongs to the stomach, or, at times, to make an otherwise non-palpable tumor palpable, the inflation of the stomach by means of air is a serviceable procedure. If the tumor changes its position with the distention of the stomach, the two are, in all probability, connected.

Of great significance in the diagnosis of carcinoma of the pylorus, when the tumor cannot be palpated, is the demonstration of visible peristaltic waves running from left to right. Even more significant, however, when present, are peristaltic waves running in the opposite direction. At times, though these waves cannot be seen, they can readily be felt by the palpating hand. Another valuable symptom, when properly interpreted, is the increased resistance in the pyloric region as contrasted with the fundal region.

The demonstration of a tumor naturally does not prove that it is malignant. To determine this point other means must be employed—above all, the determination of gastric function. There is a prevalent erroneous impression that an absence of hydrochloric acid is diagnostic of the existence of carcinoma of the stomach. It is correct that usually, during the development of a gastric carcinoma, the secretion of hydrochloric acid diminishes, so that free hydrochloric acid and frequently, also, combined acidity disappear. It is undetermined whether this hydrochloric acid deficiency is the result of the accompanying gastritis or neutralization of the gastric acidity by the alkaline secretions from the ulcerated surface of the tumor or alterations of the blood dependent upon the carcinoma. The deficient production of hydrochloric acid, however, is not a specific indication of gastric carcinoma. First, it occurs in other pathological conditions of both the gastric mucous membrane and other organs; and secondly, hydrochloric acid is present in numerous cases of gastric carcinoma. Especially when carcinoma develops on the basis of an ulcer, can the hydrochloric acid remain normal throughout the entire course of the disease.

The presence of lactic acid is another sign which, though extremely suggestive, is not pathognomonic. It is absent in many cases of gastric carcinoma, and is occasionally present in other gastric diseases. Its constant presence is, however, an extremely suspicious phenomenon. It occurs, at times, even though a tumor is not demonstrable. It cannot, however, be looked upon as an early symptom, for the two conditions necessary for its development, absence of hydrochloric acid and motor

insufficiency of high degree, make their appearance only when the carcinoma is far advanced.

The ferments are of significance in the diagnosis of carcinoma of the stomach only in so far as the location of the tumor is concerned. Basing his view upon the facts that the fundus secretes both pepsin and rennin, and the pylorus only pepsin, Glaessner has formulated the rule that the proportionate decrease of pepsin and rennin indicates a tumor of the fundus; whereas, decrease of pepsin with well-retained rennin secretion indicates a pyloric tumor. This rule, however, we cannot consider to be an established one.

Of no less importance than the determination of the secretory functions is the determination of the motility of the stomach. In a large percentage of the cases of carcinoma, situated on the curvatures, as well as at the pylorus, the motility of the stomach is greatly altered. On the other hand, it is not of infrequent occurrence that a carcinoma, especially if it is located on the lesser curvature, no wise interferes with the motor powers of the stomach. Grouping carcinoma of the stomach according to the peculiarities of the gastric contents, we have the following varieties:

1. Carcinoma with well-preserved motor functions. Here there is a deficiency of hydrochloric acid. There is neither lactic acid, lactic acid bacilli, nor sarcinæ.

2. Carcinoma with a high degree of motor insufficiency. In this group we may have: (a) Free hydrochloric acid present. Sarcinæ are usually present, but no lactic acid. Lactic acid bacilli are not present, or, if present, are in extremely limited numbers. (b) Free hydrochloric acid absent. Lactic acid fermentation is present, and also lactic acid bacilli. Sarcinæ, if present, are in extremely limited numbers.

It will be appreciated that instances of Group I would present the greatest difficulties in diagnosis, for the same secretory disturbances as are present here may occur in other gastric diseases such as gastritis, anacida or achylia gastrica, and probably also in some gastric neuroses. In the majority of the cases, however, the nature of the condition can be established by more exhaustive methods of investigation. Among these is the investigation of the gastric contents and the feces for the presence of blood.

At times, the first indication of the existence of a carcinoma is the appearance of small bloody particles on the end of the stomach tube or slightly blood-tinged stomach contents. Occasionally, however, the blood is so mixed with the ingested material or gastric secretions that it cannot be identified with the naked eye. In these circumstances the tests for occult blood must be employed. The demonstration of occult blood is of especial value in those cases of gastric carcinoma in which there is deficient secretion without stagnation. Its presence, however, is not absolutely diagnostic of carcinoma of the stomach.

Kuttner has not infrequently encountered cases of achylia in which occult blood could be demonstrated in the gastric contents. This has been especially common in drinkers, though no cirrhosis of the liver was present. Even of less diagnostic significance is the demonstration of occult blood in those cases in which hydrochloric acid secretion is maintained and stagnation exists. Instead of the gastric contents, the feces can be subjected to examination for occult blood. Great care must, however, be employed in the interpretation of the results of such an examination. The patient must, first of all, be on a diet free of meat (and soups and other meat products) for a number of days preceding the examination. Moreover, the examination must be frequently repeated. A single demonstration of occult blood is of practically no significance. Only frequent or constant positive results of the test can be looked upon as of diagnostic value.

To illustrate the confusion that the presence of occult blood may lead to, if too much dependence is placed upon it, Kuttner quotes a case of achylia in which he consistently found blood in the gastric contents and feces. The postmortem examination presented a typical picture of gastric atrophy, and, as the cause of the blood, a polypoid adenoma was found. In other cases coming under his observation he was able to find absolutely no cause for the occult blood which had been found present. Cases of the latter kind I have repeatedly seen myself. In certain cases a negative result of the occult blood test is of more value than a positive result. In the absence of hydrochloric acid with well preserved motility, the constant absence of occult blood in the feces would speak even more for the absence of a carcinoma than a positive result for its presence.

The investigation of the empty stomach may reveal features of value for the diagnosis of carcinoma. The constant appearance of pus or blood would strongly indicate the existence of a carcinoma. Pus may be present in other diseases, but these present such distinctive symptoms as to lead to no danger of confusing them with carcinoma.

Small tumor particles are occasionally vomited or removed with the withdrawal of the stomach tube. Care must be taken not to confuse small blood clots or food particles with these. Such particles can be looked upon as of actual significance only when microscopically examined and found to present the characteristic picture of an epithelial tumor.

According to Cohnheim, Embden, Stowe, and others, amebæ and flagellata are encountered in carcinoma of the stomach involving the fundus or lesser curvature, and not associated with stagnation, and Cohnheim thinks they are of relatively early appearance.

According to Salomon, carcinoma of the stomach always secretes a certain amount of albuminous serum. He consequently looks upon the presence of a fluid rich in albumin as significant of the existence of

a carcinoma. Kuttner agrees with Salomon in concluding that the suspicion of carcinoma is justified when a flocculent precipitate occurs immediately on the introduction of Esbach's reagent, or when the nitrogen content exceeds 20 to 25 mg. in 100 c.c. of the fluid.

The existence of a left-sided pleuritis may be of some diagnostic significance in carcinoma of the lesser curvature. If no other etiological factor for the existence of a left-sided pleurisy can be demonstrated, and other symptoms point to the existence of a carcinoma of the lesser curvature, then suspicion can well be entertained that the pleurisy is the result of the tumor.

The differential diagnosis of carcinomas coming under Group II *a*, those with motor insufficiency, and the presence of hydrochloric acid is at times most difficult. Here the differential diagnosis is between benign and carcinomatous pyloric stenosis. Kuttner believes that in many cases we possess no means, at present, that enable us to make this differential diagnosis. Gluzinski recommends investigating the stomach for its acid contents in the morning before food has been taken, after a test breakfast, and four hours after a test meal—all three procedures being carried out on the same day. Gluzinski claims that if, on any one of these three examinations, hydrochloric acid is found absent, it speaks strongly for the existence of a carcinoma. Kuttner does not believe Gluzinski's claim to be correct. The test is worth while applying, but much significance must not be attached to the result.

Whether or not gastroscopy can decide the early existence of a gastric carcinoma, only future investigations will tell. Similarly, serum reactions and the demonstration of hemolytic substances in the stomach contents must await the future to determine their diagnostic significance.

More hopeful than the two former procedures appears to be investigation by means of the x -rays. With the use of the Rieder meal, it appears possible to gain certain diagnostic helps pointing to the presence of a gastric tumor by means of this procedure. According to Holzknecht, gastric tumors indicate their presence in the skiagraphic picture in one or more of the following three ways: (1) They cause the appearance of what look like empty spaces or defects in the current of the mass in the stomach; (2) they cause the appearance of abnormal boundaries of the stomach mass; (3) they produce irregularities of peristalsis. Kuttner doubts very much, however, whether x -ray investigation provides any information that cannot be determined by other means of investigation. If a tumor is of such size or character as to cause the above-mentioned alterations in the skiagraph picture, it will, in all probability, present characteristic alterations of function which can be determined either by the symptomatology or by the administration of test meals.

If the diagnosis of carcinoma of the stomach is established, the immediate question to be decided is whether operative measures are indi-

cated. This question Kuttner considers in a succeeding paper. The prognosis of an inoperable carcinoma of the stomach is absolutely hopeless. Earlier or later, it inevitably leads to death.

TREATMENT. Though in years gone by many specifics have been proposed for the cure of carcinoma of the stomach, none has stood the test of time. As Osler has remarked, the only hope for the patient lies in the possibility of an erroneous diagnosis.

There is, moreover, no prophylaxis against carcinoma of the stomach. Under the conviction that carcinoma is an infectious disease, Roswell Park has recommended the treatment of a case of carcinoma of the stomach, especially if it be in the ulcerative stage, as though it were an infectious disease. He suggests that patients dying of carcinoma be cremated, instead of buried; that all material that has been in contact with the patient be burned; and that the dwelling be disinfected. However, as there has never yet been convincing evidence presented that carcinoma is an infectious disease, all of these precautions may be dispensed with. Of just as little value is the attempt to prevent the development of a carcinoma by controlling the diet. The fact, however, that carcinoma occasionally develops on the basis of an ulcer, makes it the duty of every physician to guard against the development of the former by doing everything in his power to effect the thorough healing of the latter.

Among the specifics that have been proposed for the cure of carcinoma are the cancroin of Adamkiewicz and the serum of Doyens. Despite the report of several cases which are supposed to have demonstrated the healing properties of these materials, they can be looked upon as valueless. The same may be said of the various forms of radiotherapy. Several authors claim that carcinoma of the stomach has been cured by means of the x-rays; but the possibility of an error in the diagnosis must be kept forcibly in mind in judging of these cases. The same may be said of fulguration, according to the Keating-Hart method. Von Leyden and Bergell consider that the development of carcinoma is dependent upon a deficiency of the body in hydrolytic ferments, which, according to Baird, are to a great extent tryptic. The attempt has, consequently, been made to compensate for this deficiency by the administration of various proteolytic ferments. This form of treatment has been without beneficial effect. In short, no medical treatment has proved itself to be of value in controlling the growth of a carcinoma of the stomach; and the medical treatment, consequently, resolves itself into a purely symptomatic one.

The most important element in the symptomatic treatment of carcinoma of the stomach is the regulation of the diet. General rules for the diet of patients suffering with carcinoma of the stomach cannot be laid down. Each case must be treated according to the irregularities of function that exist. In some cases only the secretory functions need correction; in others, it is the motor activity that is especially disturbed.

Above all, the food must be rich in nutriment and of an easily digested form. Moreover, the appetite and desires of the patient for various types of food must be considered; and all possible means should be used to stimulate the appetite to its limits. If, as frequently happens in these patients, a dislike for meat develops, it should be excluded entirely from the diet list with the hope that a desire for it will return later—a much greater possibility if it is temporarily excluded from the diet than if the patient is continuously forced to take something for which he has a dislike. A drug that Kuttner considers is frequently of considerable value in exciting the appetite is *condurango*, preferably given with other stomachics, and combined with hydrochloric acid. Most clinicians in this country, however, consider *condurango* no wise superior to other stomachics. Hydrochloric acid given in large doses is frequently of value in stimulating the appetite, as well as assisting in digestion. If vomiting is an urgent symptom, small bits of ice, iced carbonated waters, champagne, cocaine, small doses of chloroform given with ice, or morphine, should be employed. If these methods are not sufficient, and especially if the vomiting results from stagnation of food, the stomach should be washed out as frequently as necessary. If there should be a great deal of fermentation in the stomach it will be found of value to use a weak solution of boric acid, resorcin, or salicylic acid in washing the stomach. By employing these means, the patient can frequently be made much more comfortable, at least, than without their use. If bloody vomit occurs, a cold compress or an ice-bag should be applied to the abdomen, and only liquid food administered. If these methods should not be found efficient, all food by mouth should be withheld for two or three days, and water and nourishment should be administered by means of enemas. Pain must be controlled by compresses and by the hypodermic use of codeine and morphine. Constipation should be controlled, if possible, by the use of enemas. If this is insufficient, small-sized doses of such laxatives as cascara, licorice powder, or rhubarb should be used. Saline laxatives are to be avoided. If diarrhea intervenes, the diet should be limited and such drugs as bismuth subnitrate, tannalbin, and possibly opium, can be employed. One of the most valuable means of its control, however, is gastric lavage.

A MEDICAL CONSIDERATION OF OPERATIVE TREATMENT. Of even more importance than his first paper is Kuttner's article on the Operative Treatment of Carcinoma of the Stomach, its Indications and its Prognosis. There is, as yet, little unity of opinion as to either the indications or the value of operations for gastric carcinoma. Not only do differences of opinion exist between internists and surgeons, but even among internists vastly different attitudes toward the question are maintained; so that the general practitioner, who comes less intimately in contact with these questions than do specialists, is often quite at sea as to the proper course to follow. On the one side stand the optimists,

who claim that patients with carcinoma of the stomach are sent to the surgeon much too late and much too seldom; on the other side stand the pessimists, who so limit the indications for operation that they would have but very few patients treated by surgical interference. On account of the extreme importance of the subject, it is necessary to weigh the arguments carefully, and decide upon the proper course between the two extremes.

Indisputable is the fact that carcinoma of the stomach is a localized affection, in which one must base all his hope for cure upon operative interference. Everything that can be done to oppose the lethal termination of the disease lies in the surgeon's hands. On this basis, it might be claimed that the internist, as soon as the diagnosis of carcinoma is made, should turn the patient over immediately to the surgeon. In principle, this would appear to be proper. In practice, it is bad. Aside from the fact that such a procedure would hardly be countenanced by lay people in general, is the fact that many cases, when first diagnosed, are inoperable.

The ultimate aim of operative interference in carcinoma of the stomach is, naturally, the entire removal of the malignant tumor; in other words, a radical operation, a resection, must be performed to obtain the ideal result. Up to the present time the general experience in resections for carcinoma of the stomach has not been very brilliant. According to Clairmont, the mortality from this operation between the years 1900 and 1905, varied between 16.7 per cent. and 68 per cent. for the various operations. The average mortality was 34.4 per cent. Von Mikulicz, between the years 1900 and 1904, had a mortality of 33.8 per cent. among 68 cases operated upon. Czerny, between 1900 and 1905, operated on 62 cases, with a mortality of 30.6 per cent. Krönlein, up to the year 1902, performed 55 resections, with a mortality of 27.2 per cent. Kocher, up to the year 1898, performed 52 operations, with a mortality of 35 per cent.; between 1898 and 1903, 47 operations, with 17 per cent. mortality; between 1903 and 1905, 21 operations, with a mortality of 17 per cent.; and from 1905 to the present, 17 operations on uncomplicated cases, with a mortality of 0 per cent. Paterson, collecting the statistics of nine prominent surgeons, calculates the mortality to be 28 per cent., which agrees well with the statistics of Kausch, who reckons the average mortality as 27 per cent.

Of much more importance than the operative mortality is the question of the permanence of the cure in these cases. Makkas undertook to determine the fate of 105 patients whose stomachs had been resected on account of carcinoma between the years 1891 and 1904, in Mikulicz's clinic. He received reports from 92 of the patients. Of these, 65 were dead at the time the statistics were gathered, at the beginning of the year 1906. Only 3 of these, however, had died as the result of recurrence of the carcinoma. In the majority of the cases death occurred in

the first or second year after the operation; in 6 cases, in the third year; in 3 cases, in the fourth; in 2, in the fifth; and in 1 case, in the sixth. The average length of life of the patients in whom recurrence took place was eighteen and three-tenths months in Mikulicz's cases, eighteen months in Krönlein's; eighteen and seven-tenths months in Kocher's, and twenty months in Körte's cases. In Roux's cases the average duration was twenty-six months; but his indications for operation are much more limited than are those of the former operators.

On the other hand, however (and, according to Kuttner, this is of the greatest importance), there is a large series of observations in which the patient operated upon lived for years without a recurrence of the tumor. In general, a permanent cure is claimed when the patient remains free from recurrence three years after operation. Even after this time, however, one cannot be absolutely positive that recurrences will not appear. Kuttner has seen one recurrence five years after operation. Of the 92 cases mentioned above as collected by Makkas, 27 were living and apparently free from recurrence at the time the report was made. Seventeen of these had been operated upon more than three years previously. Cures of many years' duration have been reported by various surgeons. Kocher has reported one patient perfectly well seventeen years after operation; another, twelve years after operation. Bircher has a patient perfectly free from recurrence fifteen and a half years after resection. Mikulicz, Czerny, Körte, and others have observed patients entirely free from recurrence twelve, nine, eight, seven, six, and five years respectively after they were operated upon.

Considering these results, we are justified in drawing the conclusion that carcinoma of the stomach is absolutely curable by operative measures. Whether the mortality from operation is 20 per cent. or 30 per cent., and whether permanent cures are 30 per cent. or less, is, for the present, of less significance than the fact that, by means of resection, a certain number of patients can be saved who without operation would inevitably fall victims to the disease. A review of the reports can give us only relatively important statistics as to mortality and permanent cure; for not only will these results depend greatly upon the skill of the various surgeons, but, granted that they have the same skill, different result will be obtained by reason of differences in operative technique and choice of cases. One surgeon will perform a radical operation where another will refuse to make any attempt at removal. One will remove all the adjacent lymph glands where another will leave them untouched. Von Czerny, claiming that removal of all the neighboring lymph glands is not necessary, had a mortality, in 1904, of 17 per cent. Other operators, who place the greatest importance upon the removal of all these glands, had a mortality of from 40 to 60 per cent. There is a great list of factors of this sort which influence the operative results. Without going deeper into these considerations, it may be definitely stated, from the published

results, that, first, cases can be absolutely cured by surgical means; and secondly, that when they are not cured, life can, at least, be prolonged by these measures. Proceeding from this standpoint, the physician should keep in mind, in every case of carcinoma of the stomach, the possibility of a radical operation.

Many factors influence the results to be expected from operative procedures. One of the most important of these is, undoubtedly, the skill of the surgeon. Though Kocher can, with truth, say that the technique of gastrectomy has been so far advanced that the operative mortality is *nil*, few other surgeons would be justified, on the basis of their own results, in making so radical a statement. Another factor is the apparently different material presenting itself in different localities. Kocher's clinical material seems to have been different from that of most surgeons, and there seems to be differences in the clinical material in different cities. Kuttner is quite confident that the material of Mikulicz's clinic is quite different from that which presents itself in Berlin. These differences can be explained by the following possibilities: First, that the course and the malignancy of carcinoma of the stomach vary in different regions; second, that the intelligence of lay people differs in different localities, so that the patients in one place will present themselves at the clinic early, and in another place, so late that satisfactory operative measures are not possible; or, third, that the diagnostic ability of internists or their attitude toward operative interference varies in different localities.

That the malignancy of carcinoma of the stomach varies in different localities is generally recognized. It is, however, doubtful whether these variations are sufficient to be the sole cause of the differences in the results of the various operators. The second possibility mentioned must surely be conceded. Even today a vast number of patients suffering with carcinoma of the stomach seek the clinic or the private physician only after so long a dependence upon all sorts of household remedies that the disease has progressed too far to admit of radical treatment. This attitude on the part of the public should be vigorously contested. The people should be taught the significance of the early symptoms of carcinoma, and should be so educated that when these symptoms occur they will present themselves to capable physicians in time to permit of radical treatment.

Especially in Berlin, according to Kuttner's observations, do the patients present themselves at the clinic so late in the disease that operation is possible in but a very small percentage of the cases. In some instances this is due to the fact that the patient has sought a physician late in the disease. In other instances, it is undoubtedly due to the fact that the physicians whom the patients have sought in private have sent them to the hospital after all possibilities of surgical cure are past. Of 250 cases in the Augusta Hospital, Ewald had about one-fourth operated

on, but even many of these were too far advanced for resection. Of 126 cases in Körte's clinic, 30 per cent. were operable. Pässler, in Dresden, has also had the experience that but a small percentage of the cases coming to the hospital are in an operable stage.

It is not improbable that still another factor is responsible for these conditions, namely, that the experience of certain surgeons has not been such as to inspire the confidence of general practitioners and induce them to send their patients to the hospital for operation. This possibly explains the third point, the difference in the character of the material in various clinics. The remarkable triumphs of such abdominal surgeons as Kocher and v. Mikulicz has, in all probability, so inspired the confidence of practising physicians that they are willing to send their patients to the clinics of such surgeons for radical cure.

Without desiring to detract from the operative skill of the surgeons just mentioned, Kuttner believes that if other surgeons had the same sort of operative material, their results would be quite as brilliant. These results undoubtedly can be attained if physicians will always keep in mind the operative possibilities of carcinoma of the stomach and refer all early cases to the surgeon.

It is obviously not possible in a large percentage of cases for the general practitioner to diagnosticate the early stages of gastric carcinoma. Consequently, as soon as any suggestive symptoms present themselves, the aid of the diagnostician or specialist should be sought. The factors that would naturally direct suspicion toward the existence of carcinoma of the stomach were discussed in the previous article. There remains, however, to discuss those features which will determine the operability or non-operability in the individual cases.

The most favorable cases for gastric resection are undoubtedly those in which the tumor is located at the pylorus or is on the lesser curvature and growing toward the pylorus. Those located in the anterior or posterior wall of the stomach are seldom susceptible of radical operation, and those located at the cardia are not at all susceptible of operative removal. The same is true of those situated on the lesser curvature and growing toward the cardia. The latter offer such technical difficulties to their removal that satisfactory results can hardly be thought of.

The location of the tumor is, naturally, not the only feature that governs its radical treatment. Other features governing it are: (1) The state of nutrition of the patient; (2) the extension of the tumor in the stomach itself; (3) adhesions and the extension of the tumor into neighboring tissues; and (4) the presence of metastases.

No doubt can be entertained that a successful outcome to so serious a surgical procedure as the resection of the stomach presupposes a certain degree of general, constitutional, and heart strength. It is difficult, however, in many cases, to estimate these factors with any considerable degree of accuracy. Kuttner has again and again observed that patients

who seemed emaciated and cachectic to the last degree have withstood the operation well and eventually recovered, whereas other patients who seemed in a good state of bodily vigor have, within the first few days after operation, without any complication in the site of the wound, gone into collapse and died. The degree of emaciation does not serve as a guide to the prognosis of the operation. More important than this factor, in Kuttner's experience, is the condition of the blood, and especially the relation of hemoglobin to the number of erythrocytes. He has learned to fear more and more the severe anemia that develops on the basis of carcinoma. If the blood shows a great decrease in the amount of hemoglobin and in the number of erythrocytes, the possibilities of the patient withstanding the operation are very slight. Usually such patients succumb to heart weakness within a few days after the operation.

In regard to the second point, the extent of the tumor in the stomach itself, there is no doubt that the size of the tumor is of great significance for the severity and length of the operation. According to some surgeons, the demonstration of a palpable tumor alone is a contra-indication to a radical operation. Czerny and Rindfleisch claim that a radical operation should not be performed when a tumor is distinctly palpable, and Kraske considers it much more desirable to operate on carcinoma of the pylorus in those cases in which a tumor cannot be definitely palpated. Kuttner does not believe that the palpability of a tumor can be looked upon as a determining factor in its operability. A tumor may well be inoperable long before it is palpable. According to the statistics of Makkas, 88.7 per cent. of the cases of resection performed by Kocher in 1905 were accompanied by a palpable tumor, though it must be mentioned that this palpation was in some cases possible only under narcosis. These statistics are not in harmony with those of some other observers. Nordmann, for instance, was able to palpate the tumor in only 4 cases among 38 operated upon by Körte; and Kappler found only one tumor palpable in 30 operated cases. Makkas, in 41 cases in which a tumor was palpable, found only ten susceptible of a radical operation. The palpation of a tumor depends more upon the rigidity and thickness of the abdominal wall, the position of the stomach, and the position of the tumor in relation to neighboring organs than it does upon the size of the tumor. On this account, tumors are much more commonly palpable in women, in whom the abdominal organs are more frequently ptosed and the belly wall relaxed, than in men.

When the barest suspicion of the existence of a gastric carcinoma exists, one should never neglect to inflate the stomach. By means of this procedure it is often possible to palpate tumors that can otherwise not be demonstrated. Naturally, in order that the tumor be palpable even by this procedure it must have attained a certain size. In weighing

the possibilities of resection, however, the size of the tumor is by no means so significant as its malignancy and its tendency to growth; and from these standpoints small tumors present by no means more favorable conditions than do large ones.

The greatest barriers to the performance of a resection are adhesions and the extension of the tumor to neighboring organs. Most frequently, it is adhesions with the liver and the pancreas that prevent the total removal of the involved areas. Unfortunately, no means of investigation that we possess permits of a reliable determination whether a tumor is freely removable or is bound down to surrounding tissues. The change of position of the tumor on inflation of the stomach, its passive movability, and its descent or failure of descent on inspiration can by no means be depended upon to give trustworthy information in this regard. According to Kuttner's experience, adhesions between the tumor and neighboring organs are found much more frequently at operation than is suspected before the abdomen has been opened. This is certainly true, and often causes disappointment when the tumor is actually reached.

Even more unfavorable than the preceding features for the performance of resection is the presence of metastasis in other organs—liver, lymph glands, peritoneum, or omentum. Naturally, only those metastases are demonstrable which have reached a certain size or indicate their presence by other phenomena; as, for instance, carcinomatous peritonitis. Not infrequently, small pea-sized or bean-sized nodules exist in association with well-circumscribed, freely movable tumors. The autopsy statistics of Redlich show the presence of lymph-gland metastases in 72 per cent. of his cases. It is not the province of the internist to decide as to the necessity of removing all the neighboring lymph glands in a radical operation for carcinoma. So far as experience goes in this connection, the danger from lymph-gland metastasis after resection is but slight. Lindner, in twenty-eight cases of recurrence of carcinoma after resection, found fifteen to be local, twelve distant, and only one to involve the lymph glands. Peterson and Colmers estimate that the lymph-gland recurrence after resection takes place in 3 per cent. of the patients. According to these statistics, it seems possible that carcinoma cells carried into lymph glands may die or become otherwise innocuous.

In regard to extension of the tumor, the stomach wall itself assumes a position of considerable importance. The investigations of Petersen and Colmers have demonstrated that carcinoma of the stomach possesses a marked tendency to extend within the stomach wall itself, and this extension often exceeds the boundaries determined by macroscopic studies. The particular direction in which it tends to advance is along the lesser curvature. It is, consequently, advisable to remove as much of the lesser curvature as possible, both toward the cardia and toward

the duodenum. How far one can go in these resections is shown by the statistics of Mikulicz. Among 136 resections, with a mortality of 35 per cent., in addition to the stomach, the colon was resected in nine instances; parts of the pancreas in thirty-six instances; parts of the liver in four; and adhesions to the abdominal wall in three.

Kuttner recommends most forcibly and wisely that every internist sending a patient with carcinoma of the stomach to operation should himself be present at the surgical procedure. The actual view of the tumor and its relations, as revealed by the operation, will teach him more than the most exhaustive observations at the bedside.

According to the investigations of Petersen and Colmers, and others, the mode and degree of extension seem to vary greatly in the different types of carcinoma of the stomach. It is, consequently, advised by some that the internist should, so far as possible, make the diagnosis of the type of tumor existing in any particular case. This is, however, often—in fact, almost always—impossible; and the internist must satisfy himself with referring to the surgeon those cases which, in general, seem to present the most favorable conditions for operation. The character and extent of the operation, dependent upon the findings when the abdomen is opened, must be left to the judgment and skill of the surgeon.

If, after opening the abdominal cavity, the tumor shows itself to be inoperable, it must then be decided whether a palliative operation (gastro-enterostomy) should or should not be performed. The justification of such a procedure, when we consider the serious consequences of stagnation of food contents, must in many cases be granted. On the other hand, the results of this palliative procedure, especially in malignant cases, are by no means brilliant—not as regards the operation itself, which is one of only moderate severity, but as regards the patient's future. Though the vast majority of the patients recover from the immediate effects of the operation, the average length of life after the procedure is but six months. Hence it is important to decide whether, as the result of gastro-enterostomy, the patient is made more comfortable for the time he is to live. This question cannot be definitely answered either affirmatively or negatively. For a certain percentage of patients, gastro-enterostomy affords but the most insignificant relief; whereas others, even with far-advanced carcinoma, improve most remarkably, and find actual enjoyment in life after the performance of the operation. Though this improvement lasts, in the majority of cases, but a short time, Kuttner has seen several cases in which the patients enjoyed life for from one to two years after the operation, and one patient lived comfortably for three and a half years thereafter. The relief of symptoms, the increase of strength, the feeling of having been cured of a serious disease, the improvement in the appetite, the happy sensation of having been restored to family and occupation—in other words, the new pleasure in life that some carcinoma patients experience

after successful gastro-enterostomy is an achievement of no small proportions, and well compensates for the fact that the improvement is but a temporary one. From these considerations, Kuttner believes that gastro-enterostomy is a well-justified procedure, though not indicated for every patient with carcinoma of the stomach.

Surgeons have taken various standpoints as regards the indications for gastro-enterostomy. Arguing from the standpoint that the dangers consequent upon resection are greater than those of gastro-enterostomy, many surgeons perform almost exclusively the palliative operation, even in those cases in which there is a possibility of effecting a cure by extirpation. Kuttner is strongly opposed to such a procedure. When the dangers consequent upon the operation and the possibilities of cure are laid before the patient and his relatives, they will almost invariably choose the radical operation, when its performance is at all possible. Gastro-enterostomy should be considered only when resection is much too severe or entirely impossible. Even gastro-enterostomy should not be performed in all cases. It is indicated practically only in those cases in which there are outspoken manifestations of pyloric stenosis. It has been claimed by some that there is an advantage in gastro-enterostomy in that food is allowed to pass out of the stomach without irritating the carcinoma, and that thus irritation, that would tend to the growth of the tumor, is relieved. This purely hypothetical reasoning is hardly sufficient justification for the performance of the operation. If an operation is undertaken with the hope of performing pylorotomy, and if after opening the abdomen this operation is found to be impossible, then, even though the manifestations of stenosis have not appeared, the performance of a gastro-enterostomy is a justifiable procedure. In general, Kuttner is inclined to restrict the indications for gastro-enterostomy, and to strive with all vigor for the cure of these cases by radical operation.

The greatest difficulty in the way of the cure of carcinoma by resection is the inability to operate sufficiently early in the vast majority of cases. One of the circumstances conducive to this condition is the latent course pursued by many carcinomas of the stomach. This fact was emphasized by Hensch as early as the middle of the last century. Boas, on the basis of 243 cases of gastric carcinoma, emphasizes the same fact, and states that the malignancy of carcinoma of the stomach and intestines is to be sought not only in the neoplasm itself, but also in the latency of its growth. Kuttner agrees with Boas in saying that neither does the early recognition of a gastric carcinoma guarantee a good prognosis from operation, nor does its late recognition exclude the possibility of successful operative interference. The correctness of this statement is demonstrated by a case, recently coming under Kuttner's observation, of a patient who, presenting himself only ten days after the first definite manifestations of disease, showed multiple palpable metastases in the stomach and

liver, so that no thought of a radical operation could be entertained. On the other hand, he has seen patients who were operated on with good results a year and a half after the appearance of symptoms referable to the tumor.

Similar observations have been made in carcinoma of other regions. It may be justly stated that there is no direct relationship between the period of existence of a carcinoma and its operability. This seemingly paradoxical statement is probably to be explained by the fact that chronic carcinoma is much less malignant than carcinoma running a more acute course. This must not be interpreted as meaning that the early recognition of a carcinoma is of no value in determining the possibilities of cure in radical operation; for even in carcinoma running a chronic course, the earlier the operation is undertaken the better are the chances of cure.

Aside from these cases of carcinoma running a latent course, what attitude as regards operation should be taken toward cases in which the diagnosis cannot be absolutely established? Many surgeons recommend that in all cases that are suggestive of carcinoma of the stomach in which the diagnosis cannot be absolutely made, the patient should be subjected to an exploratory laparotomy. Kuttner is opposed to such a general rule, for the following reasons:

The cases offering the greatest diagnostic difficulties are: (1) Those in which the carcinoma of the stomach resembles a gastritis anacida, gastric atrophy, or certain gastric neuroses; and (2) those in which the diagnosis lies between benign and malignant stenosis of the pylorus. In the first group of cases there is absence of hydrochloric acid with well-preserved motor functions. Lactic acid is not present. If a carcinoma is at the basis of a case presenting these symptoms, and the tumor cannot be palpated, it must lie along the lesser curvature of the stomach, growing toward the cardia. The majority of cases presenting these characteristics are either gastric atrophies or gastric neuroses, and, consequently, the operation is an entirely useless and disadvantageous procedure. If, however, such a case is malignant, since the carcinoma is located on the lesser curvature and is growing toward the cardia, it is not susceptible of radical operation, and here, again, an exploratory laparotomy is not indicated.

In regard to the second group of cases, those in which the diagnosis rests between a benign and a malignant stenosis of the pylorus, Kuttner takes a somewhat different attitude. There can be no doubt that carcinoma sometimes starts in gastric ulcer. Hauser, on the basis of extensive histological studies, has established this relationship beyond the element of doubt. According to most text-books, the frequency of the development of carcinoma from ulcer is estimated at from 5 to 8 per cent. Fütterer and also Jedlicka believe that almost all carcinomas of the stomach develop from ulcers. Mayo Robson calculated that 60

per cent. of the carcinomas for which he performed gastro-enterostomy had developed on the basis of ulcers, and Moullin claims that 90 per cent. of all gastric carcinomas develop on this basis. The views of the Mayos' clinic upon this point are also well known in this country. Borrmann, on the basis of a study of sixty-three patients operated on by Mikulicz, comes to quite a different conclusion. In but one of these cases could he demonstrate the previous existence of a gastric ulcer with certainty.

Though Kuttner believes that Fütterer and Jedlicka have somewhat exaggerated the frequency of the development of carcinoma from ulcer, he thinks that there is an undoubted etiological relationship between the two. The general impression that a palpable tumor contraindicates the existence of gastric ulcer is by no means correct, and we have no means of recognizing the transformation of a benign into a malignant pyloric stenosis. The fact that we have no means of recognizing the early stages of a carcinomatous degeneration of an ulcer, and the fact that benign pyloric stenosis, as well as simple chronic gastric ulcer, is often subject to cure by surgical procedure, make the performance of an exploratory operation, when the diagnosis lies between benign and malignant pyloric stenosis, a perfectly justifiable procedure, according to Kuttner's views.

Kuttner is fully convinced that this is the only rational attitude to take toward exploratory laparotomy. Usually, the patient will give his consent to operation only when the physician can assure him that nothing can be accomplished by internal means or when some improvement can definitely be promised him from the operative procedure. Neither of these conditions is fulfilled in those cases in which the differential diagnosis lies between anacidity or gastric neurosis and carcinoma; and both of them are more or less fulfilled in those cases in which the differential diagnosis lies between benign and malignant pyloric stenosis.

In the latter connection Kuttner suggests that cases of simple gastric ulcer should be operated upon even more frequently and earlier than is at present the custom. Operations should be performed in all rebellious cases that do not respond to internal treatment, and, above all, the physician should avoid putting such patients upon a limited diet to such an extent as to allow them to become greatly emaciated; so that, if an operative procedure is finally performed, the patient is in a poor condition to withstand it.

Nyrop holds that operation should be performed in all cases of retention, whether the retention be dependent on benign or on malignant stenosis. Kuttner believes that this is somewhat too radical a position. Undoubted cases of benign stenosis should first be treated medically. If the symptoms of stenosis do not abate, if the patient is losing weight, or if, after a temporary improvement, manifestations of stenosis reappear,

operation should at once be resorted to. It is exceedingly important to attend to the advice not to postpone operation in these cases very long. Only too many of these cases, both benign and malignant, are treated medically until not only are the chances of cure much lessened but they are bad surgical risks. Kuttner thinks that if operation is performed in all cases of ulcer of the stomach when the above-mentioned indications present themselves, the mortality of carcinoma of the stomach would become lessened. There is no doubt that many cases of ulcer of the stomach do become transformed into carcinoma, and it is not improbable that some of the cases of carcinoma in which operation, undertaken, presumably, late in the disease, has been successful, were originally cases of ulcer, and not all the symptoms were referable to the carcinoma. On the basis of the history alone, it is impossible to tell when the benign condition may have become malignant. Kuttner closes his remarks with an appeal for physicians to observe a happy medium in their attitude toward the operative treatment of carcinoma of the stomach, avoiding, on the one hand, an optimism that exaggerates the results of operative treatment; and, on the other hand, that pessimism which fails to recognize the results that have been obtained or the possibilities of the future.

DISEASES OF THE INTESTINES.

Constipation. Hertz¹ defines constipation as a state in which none of the residue of a meal is excreted within sixty hours. This, he thinks, includes all three types of constipation, which he describes as: (1) Defecation with insufficient frequency; (2) defecation of too small a quantity in comparison with the amount of food eaten; and (3) defecation of abnormally dry and hard masses. He describes the two essentials to regularity of bowel movements as the passage of the residue of food from the stomach to the rectum in the normal period, which is from twelve to twenty-four hours, and the excretion of this mass from the rectum within thirty-six hours after its arrival there. He has formulated these conclusions as the result of his extensive *x*-ray studies. By studying normal individuals with the *x*-rays, he has found that the average time consumed in the passage of food through the small intestine is four hours and a half, and that the same amount of time is consumed in the passage of the residue from the cecum to the splenic flexure. The remainder of the twelve or twenty-four hours is occupied by the slower passage down the descending colon to the sigmoid flexure and upper part of the rectum, where the feces remain until defecation occurs. During the past two years Hertz has been studying constipation by administering two ounces of bismuth oxychloride with a meal, and periodically observing the passage of this through the gastro-intestinal tract.

¹ British Medical Journal, 1908, vol. ii, p. 1079.

The most important result of his investigations, he claims, is the discovery that cases of constipation can be divided into two great classes, which are due, respectively, to derangement in the two great physiological processes that keep the bowels regular. In the first class, the passage through the intestines is found by the x -rays to be delayed, whilst defecation is normal, so that the rectum is, as in healthy individuals, almost empty. In the second class, there may be no delay in the arrival of the feces in the rectum, but their final excretion is not efficiently performed. The delay in the first class of constipation is almost always confined to the large intestine, beyond the middle of the transverse colon, this being the only part of the alimentary canal in which the contents are solid and, therefore, require greater force for their propulsion than when they are still fluid. The slow passage through the alimentary canal is due to a want of proper relation between the propelling power of the intestines and the work to be done, and may, therefore, be due to deficiency of the former or excess of the latter.

Deficient motor activity may be due to weakness of the intestinal musculature, which is a normal accompaniment of old age, and is the frequent result of acute fevers, anemia, and cachectic conditions. It is often due to the diminished response to the stimuli that normally produce peristalsis, owing to depression of the central peripheral system in neurasthenia and insanity, and in various organic nervous diseases. Many cases of constipation of this type are the result of insufficient peristalsis owing to too little food being taken or to the food containing too little chemical or mechanical excitants, or to its being too completely digested. Finally, peristalsis may be slowed by irritation of the inhibitory fibers of the sympathetic nerves, directly as in cases of lead poisoning unaccompanied by colic, and reflexly from painful abdominal viscera.

The work to be done by the intestines is excessive when there is any abnormal narrowing of the lumen of the alimentary canal, and whenever the feces offer more than the normal degree of resistance. The feces may offer too great an obstacle when there has been any other cause of constipation and an enormous mass has consequently accumulated; and when the feces are unusually bulky, from excess of food or indigestible residue, or when they are abnormally dry and hard, owing to too little water being drunk or too much being lost in the urine or from the skin and lungs.

The second great class of constipation, to which Hertz gives the name "dyschezia," is that in which there is inability to defecate completely. The x -rays show that the passage of feces through the intestines in uncomplicated cases is normal or unusually rapid, so that aperients are useless and operations such as ileosigmoidostomy or colectomy, which have been performed for severe cases of constipation, simply interfere with a normal part of the alimentary canal. The whole of the

rectum and most of the sigmoid flexure are distended with feces, so that mechanical removal or enemata can alone produce relief and offer prospects of an ultimate cure.

Dyschezia is often due to habitual disregard of the call to defecate, from laziness, false modesty, or fear of pain in cases of anal fissure or other pelvic diseases. This results in a gradual blunting of the sensibility of the rectal membrane, the defecation reflex is lost, and the rectum becomes filled with hard feces, without causing the patient to feel the slightest desire to defecate. The retention of feces in the rectum and sigmoid flexure stretches their walls, so that their musculature becomes atonic and parietic, and natural defecation becomes more and more difficult, and finally impossible.

Dyschezia may also result from insufficient activity of the voluntary muscles of defecation the function of which is to increase the intra-abdominal pressure and so initiate and assist in the reflex act. This may be due to interference with the movements of the diaphragm, which Hertz's skiagraphic observations have shown to descend to its lowest possible level during defecation. In other cases the levator ani, which is the most important structure of the pelvic floor, may be inefficient, owing to injury produced by difficult labor.

The vast majority of cases of *dyschezia*, however, in which the voluntary muscles of defecation are at fault are due to weakness of the abdominal muscles, brought on by various causes, but most frequently by repeated pregnancies. Weakness of the abdominal muscles is the chief cause of visceroptosis, and it has generally been taught that the latter, by leading to kinks in the intestines, especially at the flexures of the colon, gives rise to obstruction to the onward passage of feces, and so to constipation. However, Hertz has never observed delay at the flexures in such cases; and, moreover, he and Morton, in a skiagraphic study of fifteen normal young adults, found that in the vertical position the transverse colon is invariably well below the umbilicus, and that the hepatic and splenic flexures are frequently quite as sharp as in any case of visceroptosis. The appropriate treatment for these cases consists in strengthening the abdominal muscles by means of exercise, massage, and electricity. The assumption of the squatting position during defecation is also of considerable help in these cases. The administration of laxatives is usually valueless, and frequently leads to low-grade inflammatory intestinal disturbances.

There is no doubt that many cases of constipation are due to this weakness of the abdominal walls to which Hertz calls attention. Though it is more frequently found in women, especially those who have borne children, than in men, it is a common condition in men. This fact illustrates how necessary it is to seek to determine the actual cause of the constipation in most patients suffering with this disorder. The strength of the abdominal wall can be tested by requesting the patient

to rise from a prone to a sitting posture against slight resistance, and also by testing the resistance of the abdominal wall to pressure by the hand. If the wall is found to be unusually weak, it is a much more rational mode of treatment to improve the tone of the abdominal muscles than to resort immediately to the use of laxatives. It would seem, after all that has been written about it, almost unnecessary to emphasize the importance of improving the muscular tone of the abdominal wall in the treatment of constipation, but nevertheless it is only too often neglected. Much of what Hertz says as to cause and treatment is merely the presentation in new form (and using perhaps unnecessary terms) of what we have long known. It is, however, all important and hence worthy of being reëmphasized.

Hertz,¹ in a second article, discusses the significance and importance of abdominal auscultation. The particular sounds to which he calls attention are those heard about the cecum. He found that in the morning before breakfast, about twelve hours after the last meal had been eaten, no sounds could be heard over the cecum. The silence continued until between three and a half and four and a half hours after breakfast, when a few sounds could be heard, which were quite distinct from those present in any other parts of the abdomen. The sounds gradually became louder and more frequent, until they reached the maximum in one hour to two hours and a half after their commencement. After this, he found it useless to listen again over the cecum, as the relation of the sounds to the time at which breakfast was taken was confused by the sounds resulting from the taking of other meals. To determine more definitely the significance of these sounds, an ounce and a half of bismuth oxychloride was administered with the breakfast to four normal individuals. It was found with the *x*-rays that the appearance of a shadow in the cecum immediately followed the occurrence of the earliest sounds in the right iliac fossa. In those investigations in which auscultation was practised without skiagraphy the first cecal sounds were always heard at about the time that *x*-ray observations had previously shown that the first traces of the food would reach the cecum. Hertz concludes from these observations that in auscultation we have a means by which the rate of passage of the contents of the small intestine from the stomach to the cecum can be measured. Auscultation may, therefore, take the place of skiagraphy, when the latter cannot be used, in the diagnosis of the types of constipation, as the latter were described in the article reviewed above.

The sounds heard over the cecum are, in all probability, he believes, due to the actual entry of the contents of the ileum into the gas-containing cecum. Their loudness varies considerably in different individuals. When, five or six hours after a meal, the gases in the cecum are largely

¹ British Medical Journal, 1908, vol. ii, p. 1602.

replaced by fecal material, the sounds diminish in intensity and become less continuous. At all times they are louder in the upright than in the horizontal position; but for the first few seconds after lying down, the sounds are generally loud and almost continuous—owing probably to the movements of the fluid contents produced by the action of gravity.

In 1903 Keith suggested, from anatomical considerations, that a strong ileocecal sphincter exists in man and most animals, as the transverse layer of the muscular coat of the ileum is greatly thickened where it enters the colon. Later, Elliott proved experimentally that such a sphincter exists. He found that it was kept in a condition of moderate tonic contraction by impulses carried by the splanchnic nerves. When these were cut, it became permanently relaxed; and the contents of the small and large intestines mixed freely with each other. Direct stimulation of the splanchnic nerves or the reflex effect of exposure of the peritoneum for a moment to cold air caused the sphincter to contract tightly, although the movements of the remainder of the intestines were simultaneously inhibited. Stimulation of the vagus and pelvic nerves had no influence upon it. Hertz found, from his skiagraphic studies, that there is a considerable collection of intestinal contents in the small intestine immediately above the ileocecal valve, just before the contents commence to be propelled into the cecum. Heile has observed through a cecal fistula that the contents of the small intestine enter the large intestine in spurts, which occur at more or less regular intervals, corresponding to the sounds already described as being heard over the cecum. This suggests that the ileocecal sphincter relaxes at intervals, and that it is perhaps controlled by a regulating mechanism in the cecum and the end of the ileum, just as the pyloric relaxation is controlled by impulses from the duodenum and the stomach.

These observations, and especially those of Elliott, make Hertz believe that the cecal sounds are of considerable diagnostic significance in inflammatory conditions in organs in the neighborhood of the cecum, the most important of which is the appendix. If the appendix is inflamed and the inflammation remains localized to the appendix, there is nothing to interfere with the movement of soft fecal masses from the ileum into the cecum; and cecal sounds are, consequently, heard. If, however, the inflammation extends to the neighboring peritoneum, or if there is perforation and foreign material escapes, the conditions are present which, according to Elliott's investigations, cause tonic contracture of the ileocecal sphincter and, consequently, cessation of the cecal sounds. In a series of cases of appendicitis, Hertz has been able to apply these principles with great accuracy, and he believes them to be of exceeding importance in diagnosing various types of appendicitis and their sequels.

Gurgling in the right iliac fossa has been described as a characteristic feature in typhoid fever. According to Hertz, however, it is by no means

a distinctive sign, as it occurs, according to his observation, in all patients to whom frequent small feedings are given, as in them fluids enter the cecum continuously, instead of for only a limited period, beginning about four hours after each meal. It is certainly of no importance as a sign of typhoid fever and scarcely deserves serious mention in that connection.

The sudden disappearance of cecal sounds, however, if associated with symptoms suggesting perforation of a typhoid ulcer, is valuable confirmatory evidence; for the perforation, being almost always in the neighborhood of the ileocecal junction, inhibits the passage of the contents of the small intestine into the cecum at a very early stage. In a case of typhoid fever recently under his observation, Hertz had auscultated over the right iliac fossa at each visit and had always heard the typical cecal sounds. The patient, who was very ill, complained one day of abdominal pain. His pulse was found to have risen slightly, but his temperature was unaltered. There was a slight increase in the rigidity of the abdominal wall, but no distention had occurred. Hertz, seeing the patient two hours after he had first complained of pain, was able to hear no cecal sounds on listening for over two minutes, although occasional gurgles were still audible in the upper part of the abdomen. A perforation was diagnosed; and at the operation, two perforations were found in the ileum, within an inch of the cecum, and spreading peritonitis was present. This may prove of interest, but before any weight can be laid upon it the observation must be repeated many times. I have often observed entire silence for long periods in auscultating the abdomens of typhoid patients who had no perforations.

Hertz finally calls attention to the importance of the localized disappearance of intestinal sounds in the diagnosis of inflammatory peritoneal conditions. If we wait for the complete disappearance of intestinal sounds, usually a generalized peritonitis will be found; whereas, a localized peritonitis may frequently be diagnosed from the disappearance of sounds in one locality, though they are preserved throughout the remainder of the abdomen. Hertz says that he has frequently heard gastric sounds after the complete disappearance of cecal sounds, due to peritonitis starting from a gangrenous appendix; and he has heard cecal sounds at an early stage after the perforation of a gastric ulcer when the stomach sounds had completely ceased. There is little doubt that we have given too little attention to auscultation of the abdomen, and the paper is valuable as a stimulus to greater activity in this regard, though we need to wait for other opinions and wider experience before accepting any conclusions as to the importance of the measure in diagnosis.

Intestinal Sand. The term "intestinal sand" is one that has apparently been grossly misused. If it is to have any useful significance, it undoubtedly should be limited to apply to collections of inorganic material

secreted in small quantities from the gastro-intestinal tract. This condition is frequently associated with mucous colitis, and is usually accompanied with a train of neurasthenic and intestinal irritative symptoms.

Myer and Cook,¹ in a short but instructive article, call attention to the frequent misuse of the term, and suggest a source of what is frequently termed "intestinal sand." Their remarks are based on the study of a patient presenting herself to them complaining of a feeling of intense fulness in the abdomen, and constipation. Examination of the stools showed them to contain from one to two drams each of small, black or brown, sand-like granules. Under the microscope these granules were seen to be oval, light to dark, brownish or greenish, translucent bodies, varying from 0.05 to 0.2 mm. in diameter. They were usually found singly, but at times were seen to occur in chains. It was suggested to the authors that the granules came from bananas that the patient had eaten, and this they proved to be true; and they feel justified in looking upon the substances that have been called intestinal sand as not infrequently the granules of the banana or other fruits.

By a curious chance, just as this article appeared, I was much interested in the case of a child that had in its feces innumerable small, bright red particles, about the color of fresh blood, which under a low power of the microscope appeared like enormous yeast-like growths in chains. As did Myer and Cook, I found many persons skilled in microscopy, including a distinguished botanist, who had no idea what they were. These proved to be from bananas also, but when the use of bananas was stopped and other fruits substituted, granules of the same very remarkable color, but of different shape, persisted. They disappeared when fruit was stopped entirely.

Since then I have examined many specimens of feces and have especially looked for these fruit remnants. What appears to be the same material can be found in small amounts in the stools of most persons. I am not sure that they come solely from fruits. It is probable, on the contrary, that they come also from some vegetables. They are usually pigmented, owing to some change that occurs in the course of their passage through the digestive tract. When they appeared in large numbers, the patients that presented them were subjects of more or less distinct intestinal disturbance, and I think the presence of many of them, or of a high grade of pigmentation of many of them, is an indication of some sort of disorder of digestion. What it is that leads to their passing through the intestine in this form in certain cases in which there seems to be always digestive disorder, while in normal persons they are almost entirely destroyed and much less pigmented, is not at all clear and is worthy of further study.

In the first case I observed they were present in enormous numbers,

¹ American Journal of the Medical Sciences, 1909, No. 444, p. 383.

constituting perhaps one-fifth—at least one-eighth—of the bulk of the stools. As the child improved they decreased in number, even though he took fruit. They may rationally be thought to be evidence of difficulty in digesting the forms of food from which they come and, therefore, when present in large numbers, to indicate the withdrawal of those foods, and in my experience withdrawal of fruits, tomatoes, and some other vegetables has been very advantageous. Hence I look upon them as not merely of curious interest in relation to “intestinal sand,” but as of importance in outlining treatment.

Furthermore, I would say that I considered them entirely different from the cases of actual intestinal sand that I have seen, and believe they can be considered to explain cases of intestinal sand only when the latter term is loosely and improperly used. Real “intestinal sand” is a material that appears to be chiefly inorganic material, and has no appearance of being simply a residue of organic material, as in these instances, but is seemingly an actual deposition of mineral salts in the intestine.

Ulcer at the Papilla of Vater. Packard¹ reports a very interesting case of complete obstruction of the common duct, which he attributes to an ulcer at the site of the papilla of Vater. The patient had had an attack of jaundice three years prior to the present trouble. Under treatment this had disappeared. Since then the patient had been in comparatively good health until one month before being seen by Packard, when he again became jaundiced. The stools became clay-colored and the urine dark. He had pain in the epigastrium and right hypochondrium. He had also had chills. The stools later became black.

Physical examination revealed a medium-sized, emaciated, deeply icteric individual. The heart and lungs were normal. In the right hypochondrium, extending from the level of the eighth costal cartilage to below the level of the umbilicus, was a smooth, oval tumor. A chronic obstruction of the common duct being diagnosed, the patient was operated upon, the gall-bladder being removed and drainage of the common duct being instituted. On account of the patient's weakened condition, the operation had to be abandoned without determining the nature of the obstruction to the common duct, which was apparently located at the duodenal papilla. Subsequently a second operation was performed, when what was apparently an ulcer of the duodenum was found at the site of the papilla of Vater. Gastro-enterostomy was performed, and a new anastomosis was made between the upper portion of the common duct and the small intestine. The patient made a satisfactory recovery, and one year after operation his condition was found to be satisfactory. The only disquieting feature was the presence of two nodes, one on each side of the scar of the operation.

¹ Boston Medical and Surgical Journal, 1908, No. 2, p. 106.

The case is extremely interesting, both on account of the unusual symptoms manifested and on account of the success of the operative procedure. The symptoms, the findings at operation, and the presence of two nodules about the scar a year after operation rather suggests that the condition may be one of that rare form of *duodenal cancer* described as a circumampillary carcinoma. Carcinoma of the duodenum is divided into the three following types according to the location of the tumor in reference to the papilla of Vater: (1) Suprapapillary carcinoma; (2) circumpapillary carcinoma; (3) infrapapillary carcinoma.

The symptoms of suprapapillary carcinoma of the duodenum are practically the same as those of carcinoma of the pylorus. The symptoms of infrapapillary carcinoma are those of chronic obstruction high in the small intestine, associated with the vomiting of bile and pancreatic juice. The symptoms of circumpapillary carcinoma are very much like the symptoms presented by Packard's patient. As the result of obstruction by the carcinoma, jaundice appears. Subsequently a portion of the carcinoma ulcerates; the bile is again allowed exit from the duct, and the jaundice disappears. Afterward, as the tumor grows larger, the common bile duct may again be obstructed; and there may thus be a continuation of these alterations between jaundice and freedom from jaundice. In addition, there is a certain amount of ascending infection of the bile-ducts, consequent upon the ulcerating mass at the intestinal end of the bile channel; and chills and other symptoms of infection may appear. There may or may not be symptoms of chronic intestinal obstruction, depending upon the size of the tumor, the amount of ulceration, and the tendency to cicatrization.

The fact that duodenal ulcer is rather uncommon in the neighborhood of the papilla of Vater and the appearance of the two nodules mentioned by Packard at the site of the operation wound strongly suggest that his case may have been one of circumpapillary carcinoma.

Duodenal Ulcer in Infancy. The rarity of duodenal ulcer in early life makes the report of two such cases, and the remarks upon them by Kuttner, of exceeding interest. The histories of the two cases are, briefly, as follows: The first patient was an infant about a month old, that was brought to the hospital ten days after birth. The mother said that seven days after birth vomiting and diarrhea had commenced. There was no fever. The stools were at first soft, liquid, and dark brown. Two days after the commencement of these symptoms there was a considerable amount of fresh red blood passed with the stools. The only noteworthy features in the examination at the time the patient was admitted to the hospital were that the child was pale and that there was considerable gaseous distention of the abdomen. After admission there were one to two movements daily, which showed neither chemically nor microscopically the presence of blood. Twenty days after admission, there was a sudden profuse intestinal hemorrhage, and the appearance

of the blood was such as to suggest its origin from the lower bowel, but examination failed to reveal a source of the hemorrhage in this region. Death occurred three hours after the hemorrhage. At autopsy, the only findings of any interest were a round ulcer, 5 mm. in diameter and funnel-shaped, in the first portion of the duodenum, and a considerable amount of bloody material in the intestinal lumen.

The second case was that of a child, aged four years, which was said to have been healthy until the day before its admission to the hospital, when a profuse diarrhea occurred. On admission to the hospital, the child was almost in collapse. The examination revealed only a distended abdomen, which was diffusely tender. While in the hospital the child had five to eight thin, bloody, slimy movements daily. Six days after admission there was a sudden large hematemesis, a short time after which the patient died. At autopsy a catarrhal inflammation of the intestinal mucous membrane was found, most marked in the colon. In the duodenum, just below the pylorus, were three round ulcers, varying in diameter from 0.2 to 1 cm. The base of these ulcers consisted only of serosa. In addition, a moderate degree of parenchymatous nephritis was found.

According to the statistics of various surgeons, and especially those of some of the more prominent English and American operators, duodenal ulcer is much more common than it has in the past been considered to be. Moynihan has operated on 114 cases of duodenal ulcer within the last seven years. Mayo Robson has performed gastro-enterostomy for the same condition 66 times; and the Mayo brothers have operated for duodenal ulcer 188 times. The fact that operations for duodenal ulcer are performed much less frequently in Germany than in America and England, as indicated by these statistics, Kuttner thinks should be attributed to the fact that the indications for operation on cases of gastric and duodenal ulcer are rather more limited in Germany than in England and America. In Germany the operation is performed almost invariably for the accidents or the complications of the ulcer, rather than for the ulcer itself. Even in Germany, however, the statistical reports of the frequency of duodenal ulcer show it to be more common than the earlier reports indicated. Krug, in 1900, found 53 cases of duodenal ulcer in 12,020 autopsies, in the Pathological Institute at Kiel; and recently Barth has reported 8 operations for duodenal ulcer.

Not only in adults, however, but also in children, does the condition seem to be more common than is usually believed. Collin, in 1894, among 279 cases of duodenal ulcer, found 42 to have occurred in children under ten years of age. Of these 42, 17, or almost one-half, occurred in the first year of life. It does seem, however, that Collin's statistics are exceptional, for according to the experience of most observers duodenal ulcer in the first year of life belongs to the medical rarities. Nevertheless, duodenal ulcers are occasionally found in infants

dying within the first two or three days of life. This possibility must, consequently, be kept in mind in cases of *melena neonatorum*.

In all probability a certain percentage of the duodenal ulcers occurring in children are dependent upon vascular disturbances and the subsequent digestion of the involved parts of the intestinal wall, which is the view generally held in regard to the causation of duodenal ulcers in adults. That the characteristics of the gastric juice are of importance in the production of duodenal ulcers is shown by the fact that almost all the ulcers occurring in the duodenum are located in the superior horizontal portion; in other words, in that portion which is subjected to the influence of the acid gastric juice. In Moynihan's 114 cases the ulcer was in this portion of the duodenum in all but seven instances.

Nephritis is claimed by many to be a cause of duodenal ulcer; and it is interesting, in this connection, that the second patient whose case is reported by Kuttner was shown at autopsy to have a mild degree of nephritis. The duodenal ulcers found in association with nephritis are probably caused, he thinks, as are uremic ulcers, by the irritation of the ammonium carbonate, which develops from the urea excreted into the intestinal lumen, a suggestion which may be correct, but is essentially pure hypothesis. Kuttner doubts very much if the nephritis in the case reported by him was of much etiological significance in connection with the duodenal ulcer; for there were in the patient absolutely no indications of uremia, as would be expected if the ulcers were of kidney origin.

Surface burns have long been looked upon as a cause of duodenal ulceration. Though Kuttner admits the frequent association of surface burns and duodenal ulcer, he does not recognize any etiological relationship between the two. He thinks that their simultaneous occurrence is a pure coincidence, and that the ulcer, in all probability, existed before the advent of the trauma.

Kuttner is undoubtedly wrong in this claim. He appears to look upon the duodenal ulcerations found after surface burns as possessing the same characteristics as the usual form of duodenal ulcer. This is not the case, however. In the first place, duodenal ulceration occurring after extensive burns are almost always in the inferior horizontal portion of the duodenum; whereas, peptic duodenal ulcers are almost invariably in the superior horizontal portion of the duodenum. The ulcers following burns are usually multiple; whereas, the others are usually single. Finally, the former are usually long and narrow; whereas, the latter are usually round or oval. The statistics presented by Kuttner of only two cases of duodenal ulcer being found in 50 autopsies on patients suffering severe burns, prove little. Duodenal ulceration occurs in by no means every case of surface burns. They are more common in the young than in the old; in females than in males; and in extensive burns of the trunk than in those of the extremities.

It might be thought that the ulceration in the duodenum in the second case reported by Kuttner stands in some etiological relationship with the catarrhal enteritis of the lower portion of the intestinal tract. However, the ulcer was by no means like the ordinary catarrhal ulceration. It was so typical of the usual peptic ulcer that, if any relationship existed between it and the catarrhal inflammation, it must have been extremely obscure.

In view of the fact that duodenal ulcer occurs three to four times as often in males as in females, it is rather interesting that both the patients whose cases are reported by Kuttner were females.

Kuttner looks upon it as a possibility, at least, that the much discussed pyloric stenosis in infants may occur on the basis of duodenal ulceration. The stenosis in these circumstances must be looked upon as a reflex pyloric spasm producing a functional stenosis. Of considerable significance in this connection is the frequent observation of blood in the vomitus of infants suffering with pyloric stenosis. Even coffee-ground vomiting has been observed. The fact that blood is not found in all cases of pyloric stenosis in infants does not exclude this hypothesis. Hematemesis is by no means a constant phenomenon in duodenal ulceration. According to Krauss, it occurs in but 33 per cent. of the cases, and according to Perry, in but 13 per cent. Another phenomenon that Kuttner believes gives some support to the hypothesis is the not infrequent occurrence of high degrees of acidity in these patients. Moreover, v. Torday has described a case that presented the picture of congenital pyloric stenosis, in which, at autopsy, a typical duodenal ulcer was found.

Kuttner believes that in obscure anemic conditions in infants and young children one should think of the possibility of the existence of a duodenal ulcer, and make examination for occult blood. It is interesting that in the discussion following the presentation of these remarks by Kuttner, Finkelstein stated that he had found duodenal ulcers so extraordinarily frequently in atrophic children that he was inclined to look upon duodenal ulcers as a common cause of infantile atrophy.

Helmholz,¹ on the basis of his clinical and postmortem studies, presents some more striking data on the occurrence of duodenal ulcers in childhood, and especially upon the relationship that they may bear to *infantile atrophy*. Of 16 cases of infantile atrophy coming under his observation at the postmortem table, 8 showed duodenal ulceration. In two of the cases, macroscopically demonstrable blood was passed by the bowel; but in the others, the symptoms were those only of a rapidly progressive atrophy, associated probably with a somewhat greater degree of anemia than is frequently present in marasmus. The age varied between one and a half and four months, and seven of the infants were males. A striking feature in some of the cases was the rapidity

¹ Deutsch. med. Woch., 1909, vol. xxxv, p. 535.

of the loss of weight, one of the infants losing 1100 grams in a period of twenty-five days.

The ulcers were quite like those ordinarily found in adults in regard to most of their pathological features. The majority of them were in the first part of the duodenum, in the superior posterior portion of the wall. Some of them were found in the descending portion or in the beginning of the third portion of the duodenum. They varied in number from one to four; in two cases there was but one ulcer; in three cases there were two; in two cases there were three; and in one case there were four. They varied in size from 0.1 to 2 cm. in diameter. The margins were sharp, the ulcer presenting a punched-out appearance. The terrace-like arrangement frequently seen in gastric and duodenal ulcers in adult life was present in only two of the cases. In one case an eroded vessel was found. Frequently small hemorrhages were found in the neighborhood of the ulcer, and occasionally a small amount of free blood was found in the lumen of the duodenum. The remainder of the intestinal tract was quite normal.

Unless intestinal hemorrhage should occur, a diagnosis of duodenal ulcer in this stage of life would appear almost impossible, though the pallor that most of these infants manifest may give some hint of the existence of such a lesion. Helmholtz gives the history of an additional case, resulting in recovery.

The diagnosis was made on the basis of rather rapid emaciation, during the course of which the patient went into rather profound collapse, followed, on the subsequent day, by the passage of a number of tarry stools. As this was the only case coming under his observation that recovered, Helmholtz's statistics give a mortality to duodenal ulcer in infancy of 89 per cent. He says, however, that it is not impossible that many cases of duodenal ulceration in this period of life go unnoticed, the patients eventually recovering.

The treatment consists in the administration of drugs tending to check the hemorrhage, such as gelatin subcutaneously, a method, however, which is to my mind nearly or quite worthless as well as dangerous, and the rectal or hypodermic administration of normal salt solution to counteract the loss of fluid. The most important element of treatment, however, consists in the nourishment, which should be only mother's milk—and that in the smallest quantity possible to sustain life.

Appendicitis. Some very interesting data are contained in the report of the Committee of the Berlin Medical Society appointed to collect and review the cases of appendicitis occurring in Berlin during the year 1907. The report is edited by Albu and Rotter.¹ In the introduction, Albu makes reference to the marked increase in the occurrence of appendicitis during recent years. This increase is commonly attributed to the

¹ Berl. klin. Woch., 1909, No. 26, p. 1199.

greater attention paid to the condition by physicians in general, and to the improvement in their diagnostic technique. Albu does not believe that these facts are sufficient to explain the striking increase in the occurrence of the disease. To illustrate the amount of this increase, he notes that in Prussia there were 8412 cases of appendicitis during 1903, as contrasted with 18,964 cases in 1907; and that in Berlin there was an increase from 1847 to 3481 during the same period. The author thinks that so striking an increase occurring throughout the entire civilized world can be explained only on the basis of a periodical endemic. Absolute evidence in support of this view can be furnished only by a decrease in the occurrence of the disease subsequent to the increase. In this connection it is interesting that a number of observers look upon appendicitis as a specific infection; and many pathologists (among others Kutz) believe that the disease is usually of hematogenous origin.

The statistics are based on 3016 cases, of which 2719 were acute and 297 chronic. The percentage of deaths in the acute cases, operative and non-operative, was 3 per cent. As to sex, 54.5 per cent. of the patients were males and 45.5 per cent. were females. This substantiates the frequently disputed claim that the male sex manifests a greater predisposition to appendicitis than does the female. These statistics are, moreover, in harmony with those compiled by Guttstadt of all the cases of appendicitis occurring in German hospitals from 1903 to 1906. Of the 49,710 cases that he collected, 44.3 per cent. occurred in females, and 55.4 per cent. in males. In contrast to these proportions occurring in acute appendicitis, are those of chronic appendicitis, in which the female sex predominates. Moreover, the percentage of female patients treated at home, instead of in the hospitals, was greater than the percentage of males. One gets the impression that the disease is milder in women than in men; that is, moreover, in harmony with the fact that in the statistics of Albu and Rotter the mortality among females was about 1.5 per cent. less than among males; and in Guttstadt's statistics it was from 1.5 per cent. to 2.5 per cent. less in females than in males.

The statistics concerning the age of the patients are especially interesting. It was found that more cases of acute appendicitis occur between the ages of ten and twenty years than in any other equal period: 34.6 per cent. of the cases occurred between the ages of ten and twenty; 29.6 per cent. between the ages of twenty and thirty; 21.5 per cent. between the ages of thirty and fifty. Only 3.5 per cent. of the cases were in individuals over fifty years of age. On the other hand, more cases of chronic appendicitis occurred between the ages of twenty and thirty than in any other period: 20 per cent. occurred between the ages of ten and twenty; 31 per cent. between thirty and fifty; and 3.3 per cent. between fifty and seventy.

The mortality of the disease does not by any means run parallel with the morbidity, as is shown by the fact that the mortality between

one and ten years of age was 17.4 per cent., between ten and twenty years, 5.5 per cent.; between twenty and thirty years, 5.4 per cent.; between thirty and fifty years, 10.2 per cent.; and between fifty and seventy years, 21 per cent. By comparing the statistics of the morbidity with those of the mortality, it is seen that the mortality is highest during those years in which the morbidity is the least. The apparent severity of the disease during the first ten years of life is probably dependent upon the fact that the diagnosis is most difficult during these years, and is, consequently, often made too late.

It was hoped that the statistics would throw some light on the etiology of appendicitis—at least, in so far as deciding how frequently it is of hematogenous origin. This could be judged clinically by determining how frequently the disease follows the acute infections, especially influenza and tonsillitis. It was found that these acute infections had preceded the onset of the appendicitis in but an extremely small percentage of the cases. Trauma, also, did not seem to be an important etiological factor, as it had preceded the disease in but three instances.

The authors next consider the question of the enterogenous origin of the disease and the frequency of preëxistent intestinal diseases. The two diseases especially considered are chronic colitis and chronic intestinal atrophy. The statistics showed that in 2 per cent. of the cases there was a preëxistent chronic colitis, and that 9.5 per cent. of the patients had been sufferers from chronic constipation. If these figures can be accepted as reliable, neither of the two diseases mentioned assumes a very prominent role as an etiological factor. Albu, however, does not believe that the figures are reliable. He thinks that the majority of patients are not able to give trustworthy information in regard to the previous existence of an intestinal catarrh or atony. In his own private practice he has found, by thorough investigation, that 50 to 60 per cent. of the patients showed undoubted evidences of a chronic intestinal weakness before the onset of the appendicitis. He believes that deficient motor functions of the intestines and the appendix are at the basis of most cases of appendicitis, and that an intestine accustomed to ejecting its contents regularly and promptly is perfectly capable of taking care of infectious material as well.

How far the intestinal functions are influenced by the inflammation of the appendix is shown by the fact that in 50 per cent. of the acute cases, and in 55 per cent. of the chronic cases, constipation was one of the earliest symptoms. Diarrhea occurred in 9 per cent. of the acute cases and 3 per cent. of the chronic cases. Vomiting was one of the earliest symptoms in 55 per cent. of the cases. In the vast majority of these cases this must be interpreted as a reflex-reaction phenomenon, and not as a symptom of peritoneal inflammation. The most frequent symptom, however, was abdominal pain, which was present in over 90 per cent. of the cases, both acute and chronic. Fever was present in 62.5 per cent.,

and 28 per cent. were afebrile; in the remaining 9.5 per cent. no mention was made of fever. The pulse rate was increased to over 90 in 57 per cent. of the cases, and was below normal in 2.6 per cent.

Great expectations had been placed upon the determination of the frequency of abdominal rigidity and its relation to the course and termination of the disease. It has been claimed that the symptom is one of great value in the early estimation of the severity of the disease. The statistics did not throw much light upon this phase of the subject, for there was not sufficient distinction made by physicians between localized and generalized rigidity. The statistics, however, did show that the symptom is an important one, and one probably not generally enough recognized and valued.

An interesting question upon which the statistics threw some light was the relation of abscess formation to the individual attacks of appendicular inflammation. It was found that 82 per cent. of the abscesses developed during the first attack of appendicitis; 10.6 per cent. developed during the second attack; and 3.3 per cent. developed during subsequent attacks. Thus, it seems that the inflammatory process tends to suppuration only during its first outbreak, and that with each recurrence the tendency to suppuration becomes less. This is probably the reason why, as a further analysis of the statistics shows, the character of the recurrence seems to become less severe with each new attack. Of the fatal cases of acute appendicitis, 10.2 per cent. of the patients died during the first attack; 5.4 per cent., during the second attack; while 1.6 per cent. died in the third or a subsequent attack.

The statistics do not permit of trustworthy deductions in regard to the percentage of cures without operation, for the statistics cover only a year, and, as experience has taught, recurrences may appear after the lapse of one or two years, or even longer. As far as can be judged from the statistics, however, a recurrence after an interval of more than two years is a rarity; the longer the interval after an attack, the smaller is the chance of a recurrence. If, on the other hand, the first recurrence sets in within a few months after the original attack, it is probable that a number of recurrences at short intervals will follow.

Of the total number of acute cases collected, 68.5 per cent. were cases of but a single attack; 19.6 per cent., cases of two attacks; and 11.7 per cent., cases of at least three attacks. It is seen that the large majority of patients with acute appendicitis have but a single attack; and that when this is over, the disease is over. Moreover, with each subsequent attack, the danger of still further attacks becomes less. These facts, together with the fact already mentioned, that the severity of each attack decreases with the recurrence of the attacks, led Albu to the conclusion that after a patient has had one acute attack of appendicitis, the danger of further attacks cannot be looked upon as a legitimate indication for operation. Only the severity of the individual attack

or the frequency of the recurrences can be considered, according to his view, as indications for operation. When operation is resorted to, it must be performed early. The operative mortality rapidly increases after the first day of the disease in severe cases. In general, the statistics show the mortality to be least in the cases operated upon the first day of the disease; it is a little higher in the cases treated medically, and much higher in the cases operated upon after the second day.

Elongated Cecum vs. Chronic Appendicitis. There is no doubt that most clinicians, as well as surgeons, have been sorely perplexed to find some patients with chronic appendicitis complaining quite as definitely of symptoms referable to the right iliac fossa after appendectomy as they had before the removal of the appendix. This circumstance has led many observers to the conclusion that certain cases interpreted as chronic appendicitis are, in reality, not instances of disease of this organ in any form. Wilms,¹ as the result of his experience with cases of the type mentioned, believes that in many cases of so-called chronic appendicitis the pain is not localized in the appendix itself, but is dependent upon the tugging of an abnormally long and movable cecum upon its mesentery or that of the appendix. It may be stated as a fact, according to Wilms, that at the present day every fourth or fifth case of appendicitis sent to the surgeon falls into the class of so-called chronic appendicitis. The patient of this type has usually had no severe attacks, but complains of a more or less constant pain in the right iliac fossa. When such patients become constipated, as often happens, the pains increase and, at times, radiate into neighboring regions—the back, the pelvis, or the thigh. McBurney's point and the immediately surrounding areas are generally distinctly painful to pressure.

When this type of patient is operated on, the appendix is usually found to be macroscopically normal. As a general rule, the cecum and the appendix are easily drawn out of the wound and laid on the abdominal wall. The operation is usually technically simple; but when the surgeon critically analyzes the facts, he usually has the feeling that the anatomical findings no wise have justified the procedure. He usually hopes to find this justification in the microscopic examination of the excised appendix; as almost every appendix manifests some slight microscopic inflammatory changes, he feels satisfied with the results of the undertaking. When, later, however, he finds that the patient is complaining quite as much as before the operation, this feeling of satisfaction is dispelled. This, at least, has been Wilms' experience, and he does not doubt that it has been that of other surgeons.

It is a noticeable fact that, despite the enormous amount of literature of the last decade on the subject of appendicitis, no surgeon, as yet, has made a statistical compilation of the results of his operations for

¹ Deutsch. med. Woch., 1908, vol. ii, p. 1756.

chronic appendicitis. Wilms has himself not made a statistical review of his own cases; but he is well convinced that the majority of the patients on whom he has operated for chronic appendicitis have, subsequent to the operation, complained of the same symptoms as they did before. It was this circumstance that led him to look carefully for some other cause for the symptoms in the patients of this type presenting themselves for operation. He soon became impressed with the fact that the majority of these patients possess an extremely long and movable cecum. Even to palpation, an abnormal amount of gurgling in the right iliac fossa is appreciated; and one can frequently feel the distinctly movable cecum. When it is contracted, it gives the impression of tumor-like resistance, which, on superficial examination, may be confused with a floating kidney.

The length of the cecum is naturally, subject to great variations. Wilms calls only those cecums abnormally long that can with perfect ease be laid on the anterior abdominal wall. He has by no means infrequently found cecums 10 or 15 c.c. of which could be easily drawn out of the abdominal wound. If an abnormally long cecum and the consequent tugging and distention, when it is full, produce the pain in these cases, then the pain should disappear after appropriate fixation of the organ.

For the past nine months Wilms has been pursuing a course in conformity with this hypothesis in all of those cases in which he has found an abnormally long, movable cecum, and in which the appendix was not bound down by adhesions. This he accomplished by loosening a portion of the peritoneum from the crest of the ilium, by which procedure a sort of pocket is formed, into which the cecum is placed. This operation Wilms has performed forty times. The results thus far have been extremely gratifying. Among the cases in which he has so operated have been some in which an appendectomy had been previously performed without alleviation of the pain. The subsequent fixation of the cecum has resulted in entire freedom from the previous symptoms. In those cases in which no previous operation had been performed, he has removed the appendix, in addition to fixing the cecum. It might naturally be claimed that the improvement in these cases was due to the appendectomy, and not to the cecum fixation. Wilms is, however, firmly convinced that the vast majority of the cases in which both operations have been performed offer a marked contrast as regards subsequent symptoms to those in which only appendectomy was done.

In an attempt to determine the correctness of his view, Wilms established what might be called a control series of five cases. These five patients, manifesting the symptoms of chronic appendicitis, and possessing, at the same time, long, freely movable cecums, were operated upon by removing the appendix without fixing the cecum. All five patients manifested exactly the same symptoms after the operation as

they did before. Wilms thinks that the contrast between the condition of these patients after operation and that of those in which the cecum was fixed cannot be a pure coincidence.

Wilms does not wish to be interpreted as claiming that chronic appendicitis cannot be cured by removal of the appendix. It is his belief that some cases interpreted as chronic appendicitis are dependent upon an unusually short mesoappendix, and that the pain complained of results from the pull on this when the cecum becomes filled with feces or distended with gas. This mechanical disturbance is naturally removed when the appendix is excised. He, moreover, thoroughly agrees with Hochenegg, who recognizes many other mechanical factors in the production of pain in the region of the appendix. The position of the appendix is the cause of pain much more frequently than is inflammation of its mucous membrane. According to Hochenegg, subserous fixation of the appendix is an especially frequent cause of the pain attributed to chronic appendicitis. Naturally, even in these cases, the cecum is responsible for the pain in so far as its distention is the exciting factor.

An objection that, as Wilms recognizes, can be made to his hypothesis is the undoubted existence of a long, movable cecum in many patients who have no symptoms of chronic appendicitis. In this connection he mentions that it is possible for a floating kidney to exist without causing the characteristic pain. Only when the nerves running in the fibrous attachments of the kidney are pulled upon does the pain appear. The same may hold good of the long, movable cecum.

Wilms' views may be thought to give support to the internal treatment, rather than the surgical treatment of patients presenting themselves with the symptoms of chronic appendicitis; for, if the symptoms can be referred to mechanical effects of constipation and distention of the cecum, the medical correction of these derangements of function should often suffice to cause the disappearance of the symptoms. In this connection, Wilms mentions that not only has treatment of appendicitis in the past by the correction of constipation been devoid of satisfactory results, but, also, that the majority of patients would still prefer an operation, with its subsequent eight days of hospital treatment, to the long-continued regime of a cure for constipation. Moreover, it must be recognized that even the cause of the constipation may be found in an unusually long colon, and especially in a long, movable cecum. The latter is probably true occasionally, though certainly not often. The immediately preceding argument appears to me both superficial and very unwise. It should be well-nigh an axiom that if a condition is curable without operation, no operation should be performed unless especial circumstances demand it and constipation is certainly usually curable. Furthermore, if constipation exists, it should be cured as well as any appendicular symptoms due to it. Also, "eight days of hospital treatment" by no means comprises all the disadvantages of such operations.

More or less serious complications and sequels are not uncommon, even though the mortality is low. My warmth of adherence to the view that operation is wise in cases not benefited by medical measures, when there is a rational reason for operation, is no less than the warmth of my feeling that wholesale recommendation of operation because it is the easiest thing to recommend damages both medicine and surgery.

Appendicitis in Childhood. Vincent¹ discusses acute appendicitis in children on the basis of her experience in the Children's Hospital of Boston, and summarizes her observations as follows:

Acute appendicitis is rare in infancy, but is more common in childhood than is generally supposed.

An early diagnosis is difficult, and the first stages and lighter forms of the attack may be easily overlooked.

The course of the disease is more rapid in children than in adults; the involvement of the peritoneum and the appearance of pus are early features. Diffuse peritonitis is probably more frequent in adults, but there is greater tendency in children to the formation of a localized abscess.

A child is never so young and seldom so sick as to contra-indicate surgical interference, but the extent of the operation must always be measured by the condition of each patient. Children stand short operations, but may be needlessly lost through prolonged and ill-advised efforts to do more than is absolutely essential.

The prognosis is more uncertain in children than in adults. Age is a very important factor. In children over ten years of age the prognosis is at least as good as in adults. In children under five years it is worse; and in infants the prognosis is exceedingly grave.

Day and Rhea² report the interesting occurrence of a *carcinoma of the appendix* in a child, aged nine years and one month. The patient had presented symptoms suggestive of acute appendicitis for two months. At operation, a gangrenous, perforated appendix, containing a fecal concretion, and local peritonitis were found. Macroscopically, no tumor was demonstrable. Microscopically, however, the appendix showed a scirrhus carcinoma, involving the distal 8 mm. of the organ, and infiltrating the periappendicular tissue. This is the most frequent form of tumor found in the appendix, especially of young persons. The child made an uneventful recovery after appendectomy, and seven months after operation was quite well.

Dilatation of the Large Intestine. Chronic dilatation of the large intestine without anatomical cause is a condition of recognized occurrence in childhood, and is then often called *Hirschsprung's disease*. The same findings in advanced life are of much less frequent occurrence. In a large series of cases collected by Löwenstein, in 1907, only three

¹ Boston Medical and Surgical Journal, 1908, vol. ii, p. 427.

² Ibid., p. 748.

were over seven years of age, and but nine of the cases occurred in individuals over twenty years of age. In view of this rarity of the condition in adult life, two cases of this type reported by Versé¹ are of interest. One case occurred in a man, aged sixty-five years, suffering with chronic pulmonary tuberculosis of moderate degree. The patient had been suffering with symptoms referable to the intestines for five months before his death. These symptoms consisted of marked abdominal distention, constipation, and loss of appetite. At autopsy, an enormous hypertrophy and dilatation of the colon was found, which the author looked upon as an instance of idiopathic dilatation. This diagnosis, however, seems somewhat doubtful, from the fact that a tuberculous ulcer was found in the sigmoid, just above the lower limit of the dilatation. Though this ulcer was not of a type or size to have produced cicatricial stenosis, it is not impossible that it produced, at least, a sufficient reflex irritation to cause spasmodic stricture in the lower portion of the sigmoid.

The second case was that of a man, aged seventy-two years, who had been suffering for an indefinite period with intestinal symptoms, the most troublesome of which was periodical distention of the abdomen, which would disappear after the passage of large amounts of feces and gas. At autopsy, an enormous distention of almost the entire colon was found, associated with moderate hypertrophy of the wall of the large bowel. Absolutely nothing could be found that could be interpreted as an intestinal obstruction. An interesting feature was the atrophy of the left lobe of the liver, apparently resulting from pressure by the dilated transverse colon.

The most interesting question in regard to these cases is whether they are congenital or whether they are purely acquired, as a result, for instance, of chronic constipation. Versé does not believe that the condition can be looked upon as purely an acquired one, for it is not believed that a normal intestine can undergo such extensive change. It is doubtful, however, whether the condition, as such, is congenital. In all probability, some such anomaly as an unusually long sigmoid, as has been described by Curschmann, exists, which can cause sufficient obstruction to the passage of feces to result, after many years, in hypertrophy and dilatation. Such a condition in a stage where it was readily subject to fairly successful treatment, but still extremely marked when untreated, I have seen in an adolescent. There was scarcely any doubt as to the cause. Additional factors may be intercurrent disease or inanition, which tend to weaken the resistance of the intestinal musculature. It is, moreover, possible that an intestine morphologically normal can be functionally so weakened by overloading and chronic constipation, as to result in dilatation, just as an acquired dilatation of the stomach is often succeeded by hypertrophy of the wall.

¹ Münch. med. Woch., 1909, vol. lvi, p. 654.

Various observers have proposed, within the recent past, that cases of Hirschsprung's disease occurring either in the young or the old, resulting from some such abnormality, as an abnormally long sigmoid or kinking of the sigmoid, should be separated from those in whom the hypertrophy and dilatation themselves are of congenital origin. Whereas, the latter usually have the name megalocolon applied to them, the name pseudomegalocolon has been proposed for the former class. It can be readily recognized, however, that this is not a very suitable term. Versé suggests, for the true cases, the term primary idiopathic megalocolon; and for the others, the term secondary idiopathic megalocolon.

Acquired Diverticula of the Intestine. I described, last year, two of the pathological processes resulting from acquired intestinal diverticula. These acquired intestinal diverticula, which may be located in any portion of the large or small intestine, usually have their seat about the sigmoid. They vary greatly in number. Hansemann has found as many as 400 in a single case. They occur almost exclusively in elderly individuals and are almost invariably found along the mesenteric attachment of the intestine, usually at the point where a vein enters the intestinal wall. On account of this fact, and on account of the fact that the condition has been observed frequently in patients with chronic heart disease, chronic passive congestion has been looked upon as an etiological factor in their production.

In addition to the pathological results of acquired diverticula mentioned last year, Franke¹ looks upon the diverticula as probably accounting for some cases of long-standing resistant colitis and sigmoiditis. His opinion is based, primarily, upon the case of a patient who had for five years been complaining of the symptoms of a profound colitis. For about twenty years previous to this time he had been subject to constipation. The condition was so resistant to medical treatment that the patient finally sought surgical aid. At operation, Franke found a greatly thickened colon and sigmoid, containing in the neighborhood of 100 diverticula. A portion of the colon was resected, and the patient made a satisfactory recovery. Since this time he has been almost, if not entirely, free from his former symptoms. Franke thinks it not improbable that many of the cases reported within the more recent past as hyperplastic or infiltrating colitis or sigmoiditis are instances of the same condition as he found in his patients; and he believes that operation, at least of an exploratory nature, should be undertaken in all cases of resistant chronic colitis and sigmoiditis. This is a sweeping deduction from one case. Some conditions of this sort are wholly unsuited to operative measures, and that fact can frequently be determined by ordinary clinical measures without exploratory laparotomy. At present we may fairly say that surgical interference is being recommended in

¹ Deutsch. med. Woch., 1909, vol. xxxv, p. 98.

gastro-intestinal conditions with too little discrimination. On the other hand, conditions such as Franke describes in his own case, when recognized or suspected, are wisely subjected to operation when they have resisted other treatment and the condition seriously disturbs health.

Omental Torsion. Practically all that is known regarding omental torsion is to be found in a contribution made by Corner and Pinches, in 1905. Subsequently, Presch published an able paper on the subject; and more recently, Lejars collected all the reported cases, numbering 66 up to the time of his publication. The following three varieties of omental torsion are recognized: (1) Abdominal, (2) hernial, and (3) hernial and abdominal. In the abdominal type, the torsions of the omentum are unaccompanied by hernia. In the hernial type, they occur within a hernial sac; and in the hernial and abdominal type, the torsion is not limited to the hernial sac, but extends into the abdomen; or there may be a twist in both the hernial sac and the abdomen. By far the largest percentage of cases fall within the hernial or the hernial and abdominal type. But 7 of the 66 cases collected by Lejars were of the abdominal type; 67 per cent. of these 66 patients were males; and 80 per cent. of them were between the ages of thirty-five and fifty-five years.

Fuller¹ reports a case of abdominal torsion of the omentum, and reviews the interesting characteristics of the condition. The etiology is obscure. Many hypotheses have been presented, but none of them is quite satisfactory. Lejars regards tumors of the omentum as a factor predisposing to torsion, and Richardson believes that matting of the omentum favors it. As hernia is found in such a large percentage of the cases of omental torsion, it naturally impresses itself as being a potent factor in the etiology of the condition. It is not improbable that many of the cases reported as abdominal torsions were, in reality, hernial or hernial and abdominal torsions in which the hernia was not diagnosed.

Experimentally, Payr has produced omental torsion by the production of gas cysts in the omentum. This observer believes that the very distensible veins, often becoming so much longer and more tortuous than the stiffer arteries around which the veins turn or rotate, may bear an etiological relationship to the torsion. Other observers have claimed vigorous exercise, continued coughing, and external trauma of various kinds to be the responsible agents. Fuller believes that no one of these factors alone sufficiently explains the production of this interesting condition. In his own case, the tip of the omentum was adherent to the right Fallopian tube and broad ligament; he believes that the adhesion was an important factor in the production of the torsion, and thinks it not improbable that in other cases the same factor may have been at work, the adhesions subsequently disappearing—probably as the result of the torsion.

¹ Surgery, Gynecology, and Obstetrics, 1908, vol. vii, p. 231.

In none of the cases of the intra-abdominal type of torsion has the diagnosis been made before operation. The symptoms naturally depend upon the rapidity and the extent of the torsion. There is usually more or less diffuse abdominal pain and tenderness, rigidity, and distention. Shock and fever will depend upon the severity of the process and the occurrence of complications. The symptoms have been described, in brief, as those of intestinal obstruction without vomiting—which, though it may be present, is not a common symptom.

Grant¹ reports a case of apparently abdominal torsion of the omentum in a man, aged twenty-eight years. In this case, also, the omentum was adherent. The adhesion existed between the ileum, just above the cecum, and the tip of the omentum. It is interesting that this patient had a hernia on the right side when he was two years old. He wore a truss for two years, after which there was reported complete cure of the hernia. Since that time there had been no symptoms or signs suggestive of the existence of a hernia. The treatment is, obviously, purely surgical.

DISEASES OF THE LIVER.

Cyst of the Common Duct. Lvenson² reports a case of cyst of the common bile duct, and collects 28 additional cases from the literature. Rather interesting data are presented by these collected cases. Of the 19 instances in which the sex is mentioned, 17 were in females. The average age was fifteen years and eight months, and 15 of the 22 patients whose ages were given were under twenty years of age. Lvenson thinks that the cause of the cyst-formation probably lies in a congenital weakness of the duct wall, associated with a temporary obstruction of the peripheral portion of the lumen of the duct, which may subsequently become permanently occluded. The only treatment that appears to be of any value is the performance of a cholecystenterostomy.

Hepatic Cirrhosis. The modern views of the nature and pathogenesis of cirrhosis of the liver are very well presented in a recent article by Ribbert.³ According to the present conceptions of liver cirrhosis, the first change is a more or less extensive necrosis of liver tissue. In consequence of this loss of tissue, there is a certain amount of connective-tissue and bile-duct hypertrophy, and usually also some compensatory increase in the remaining liver tissue. The resulting liver tissue exists in the form of small islands surrounded by bands of connective tissue. These islands may have two different forms. They may consist of merely the undestroyed liver tissue and preserve the normal acinous structure. This is the case when there has not been very extensive

¹ Surgery, Gynecology, and Obstetrics, 1908, vol. vii, p. 230.

² American Journal of the Medical Sciences, 1909, No. 445, p. 563.

³ Deutsch. med. Woch., 1908, No. 2, p. 1678.

destruction of tissue. In the second form, which is the more frequent, the islands consist partly of remaining normal tissue and partly of the compensatory tissue. Under these conditions the normal acinous structure is destroyed, the islands taking various shapes, according to the direction of growth of the newly formed compensatory tissue. No central vein is to be found, but only irregular bands, consisting of two or three rows of liver cells. This compensatory process is frequently called regeneration. According to Ribbert, however, this term is only in small part applicable, for the process is essentially a compensatory hypertrophy and hyperplasia. A regeneration of liver tissue from bile ducts, such as is frequently spoken of, does not, in Ribbert's opinion, ever occur.

As regards the relation between the necrosis of liver tissue and the connective-tissue hypertrophy, we hold a different opinion today from that formerly held by pathologists. It used to be thought that the interstitial process was primary, and the disappearance of parenchyma entirely a secondary feature. Now, however, it is generally accepted that the destruction of parenchyma is primary, and that only as the result of this does the growth of connective tissue occur. The destructive agent, in all probability, comes from the intestinal tract, and is carried to the liver through the portal vein. According to its amount and intensity, it destroys varying amounts of liver tissue. This can be recognized by several features. In the first place, we not infrequently see, especially in the so-called hypertrophic cirrhosis, areas frequently as large as two or three acini, in which there is extensive destruction of liver tissue, without, however, any connective-tissue hyperplasia. Secondly, as Kretz has shown, we not infrequently find, after absorption of the necrotic portion, a central vein completely surrounded by connective tissue. Such a picture is possible only if the lobule has previously undergone complete necrosis. Thirdly, as Jores has shown, occasionally the complete acinous structure is preserved, with the central vein completely surrounded by radially arranged, new-formed bile ducts, and no liver parenchyma whatsoever remaining.

It is usually noticed that the destruction of tissue and the subsequent hyperplasia are not uniformly distributed throughout the entire organ, but that both processes occur much more prominently in some areas than in others. This might be thought to militate against the hypothesis that the toxic agent is carried from the intestines to the liver by the portal vein. It might be expected that a toxic agent absorbed from the intestines would affect the liver tissue uniformly, as occurs, for instance, in phosphorus poisoning, beginning at the periphery of the acinus and extending toward the central vein. As a matter of fact, non-poisonous substances, such as hemoglobin, carmine, and fat, injected experimentally, do become localized with great regularity in the peripheral portions of the lobules. It has been claimed by some that certain areas are

affected, while others are not, because the latter may have greater resistance than the former. Ribbert believes that we are not justified in accepting this hypothesis, and thinks that the unequal distribution of the process is purely the result of the unequal localization of the toxin. He has shown experimentally that when two liquids of the same specific gravity, but of different color, are allowed to run from two different tubes into the same tube, the two different colors will remain fairly well separated for a considerable period. Since the portal vein carries blood from stomach, pancreas, and spleen, in addition to that of the intestines, he believes that this admixture of toxic and non-toxic blood, on the basis of the mechanical principle described above, sufficiently explains the unequal distribution of the involvement in the liver. In order to afford more conclusive experimental evidence than that of the colored fluid in the glass tubes, Ribbert injected an emulsion of extremely fine carmine granules into a mesenteric vein of an animal. This was allowed to flow in so gradually as not to disturb the normal blood current. Microscopic examination showed the carmine granules to be distributed in the liver with great irregularity. Many lobules contained none at all. Sharply separated from these were others in which the periphery of the acini contained many granules; and in the same neighborhood were others in which but few granules were deposited.

It is generally considered that any agent producing cirrhosis of the liver must act upon it constantly and for a long period of time. Ribbert does not believe that this is always the case—nor even, in fact, that it is generally the case. He thinks that a toxic agent active for but a very short period is able to induce sufficient change to lead subsequently to a high degree of cirrhosis. He finds substantiation for this view in the cirrhosis-like changes that occur in acute yellow atrophy of the liver that does not result fatally. According to his opinion, there is no difference in principle between acute yellow atrophy of the liver and the primary necrotic changes in cirrhosis of the liver. It is merely a difference in degree and distribution of the toxic agent. The subsequent changes, connective-tissue and bile-duct hyperplasia, are quite the same in the two instances. The absence of extensive connective-tissue proliferative changes in many cases of acute yellow atrophy can be explained on the basis of the toxic agent being so profound as to destroy the connective tissue as well as the parenchyma.

If the hypothesis is correct, that a cirrhosis need not be the result of a long-continued toxic action, but can quite as well result from a single intoxication, it explains the frequent cases in which one finds connective-tissue hyperplasia without any necrosis. The toxic agent that was active, in this case, has, according to this hypothesis, long since subsided. This failure to find evidences of necrosis was previously explained by the hypothesis that the necrosis occurred so gradually as not to be demonstrable. If we accept the newer view, it is not necessary to retain

any such artificial hypothesis, because the phenomenon can be well explained on the basis of a toxic agent that is active for a short time and subsequently subsides. It, moreover, explains those cases in which more or less extensive necrosis is met with; for in these cases, in all probability, death has ensued before the necrotic cells have been absorbed and connective tissue has grown in to replace them.

Meyer,¹ in addition to presenting an interesting historical review of the pathology of cirrhosis of the liver, makes some instructive observations upon the etiology. Though alcohol has been long looked upon as the all-important cause of cirrhosis of the liver, many observers at the present day doubt that its role in the production of cirrhosis is as important as the older pathologists considered it to be. Hansemann very concisely states one of the important reasons for his attitude in doubting the significance of alcohol as a causative factor in cirrhosis as follows: "The percentage of men who are subjects of liver cirrhosis and are also drinkers is very large; the percentage of drinkers, however, who suffer with cirrhosis of the liver is very small."

Hansemann has, for many years, carefully studied the livers of drinkers, and has not more frequently found the signs of beginning liver cirrhosis in these than he has in those who did not use alcohol. Others, however, claim to have found in these subjects changes indicative of a beginning cirrhosis. Kretz, for instance, to whom we are indebted for much of our present knowledge of cirrhosis of the liver, studied the liver of a patient dying in an insane asylum, who, only shortly before his death, commenced to indulge excessively in alcohol. In the microscopic examination of the liver, he found changes which he describes as the earliest stage of atrophic cirrhosis.

Whatever attitude one may take in regard to alcohol and cirrhosis of the liver, it cannot be denied that there is some association between the two. What the nature of this association is, is another question. One of the most significant facts in regard to the etiological relationship of alcohol to cirrhosis is the relatively frequent occurrence of cirrhosis in children who have used alcohol freely. The results of animal experimentation are also exceedingly important. It has never been possible to produce in animals a typical cirrhosis of the liver by the administration of alcohol by means of the intestinal tract. However, Mertens has produced typical cirrhosis by causing the animals to inhale the fumes of alcohol. This observation of Mertens adds valuable support to the theory of Albrecht, Kretz, and others, that the primary effect of the alcohol is on the blood; and that the destruction of the blood is the immediate cause of the cirrhosis. The particular element of the blood that is supposed to be damaged, and thus lead to cirrhosis, is the red corpuscles. In this connection, it is interesting that Albrecht

¹ Münch. med. Woch., 1903, vol. ii, p. 2276.

claims to have demonstrated a superficial layer of a fatty substance on the surface of the red blood corpuscles, which would be readily subject to chemical attack by the alcohol.

Another view of the relationship of alcohol to cirrhosis is that excessive amounts introduced into the gastro-intestinal tract produce an abnormal amount of fermentation and putrefaction, and the absorption of toxic substances resulting from this causes the cirrhosis. That auto-intoxication is an important factor in various forms of liver degeneration is well known. It is undoubtedly some form of auto-intoxication that is responsible for the liver changes in puerperal acute yellow atrophy of the liver and in eclampsia. Various infectious diseases have also been claimed to be responsible for the origin of cirrhosis of the liver. These claims, however, have never been satisfactorily substantiated, though Meyer admits that a case described by Steffen seems to warrant the belief that malaria was the cause of the cirrhosis.

It is highly probable, indeed, that *malaria* plays an important role in the etiology of cirrhosis, especially the hypertrophic form. The experience of the English physicians in India, as well as that of many physicians in the Southern part of the United States, justifies the opinion that many cases of cirrhosis, especially the hypertrophic form, may be due to malarial infection. It is not impossible that in these cases the blood-destruction by the malarial organism is the immediate agent responsible for the liver changes. This is perfectly reasonable, since we know that malaria is an important cause of chronic nephritis.

Ascending affections of the biliary tract have also been looked upon as an important etiological factor in cirrhosis, especially in the so-called hypertrophic biliary cirrhosis. Others deny the possibility of a cirrhosis arising from an ascending infection of the bile ducts. Naunyn is especially prominent among these, substantiating his claims by the infrequency with which cholelithiasis is attended by cirrhosis of the liver, despite the fact that the condition most favorable for an ascending infection are present in this disease. Meyer states that Naunyn's view is, moreover, substantiated by the fact that experimentally an ascending cholangitis has never been shown to produce hypertrophic cirrhosis. This statement of Meyer's is incorrect, for, both experimentally and clinically, obstruction to the outflow of bile, associated with infection of the bile-ducts, has been shown to produce undoubted hypertrophic cirrhosis of the liver.

The association of enlarged spleen with cirrhosis of the liver is especially interesting in those cases which Banti has described and which are now designated as *Banti's disease*. The characteristics of these cases are, in addition to atrophic cirrhosis and splenic tumor, a more or less severe degree of anemia and ascites. Banti and his followers claim that this symptom complex forms a distinct disease, differing from other cases of cirrhosis of the liver, and look upon the spleen as the focus of disease

responsible for other changes. They find substantiation for this view in the fact that in several cases presenting these characteristics extirpation of the spleen has been followed by a disappearance of the anemia and the other symptoms characteristic of the disease. Within recent years there has been much doubt cast upon the view that Banti's disease is an independent condition. Many cases of Banti's disease cannot be differentiated from severe cases of cirrhosis of the liver, splenic anemia, or splenic pseudoleukemia. In all probability the anemia, the atrophic cirrhosis, and the enlarged spleen of Banti's disease are dependent upon the same underlying cause.

It cannot be denied that patients presenting the characteristic symptoms of Banti's disease have occasionally been greatly helped and possibly cured by splenectomy, but this does not necessarily mean that the spleen is the primary seat of disease. It may equally mean that a condition of the spleen that has developed secondarily prevents recovery from the primary condition when it would otherwise occur, or, at least, the primary disease would have been much less crippling. There are many instances of similar conditions. Chronic interstitial nephritis, for example, would be a much less important condition than it is in its advanced stages if we could remove the cardiovascular changes that it produces and that so commonly assume, in advanced cases, the commanding role.

DISEASES OF THE PANCREAS.

Methods of Study. I mentioned last year, in the article on Diseases of the Digestive Tract, the work of Boldyreff, who described in animals regurgitation of bile, pancreatic juice, and succus entericus from the duodenum into the stomach. This phenomenon, according to his investigations, occurred after the introduction of oil or highly acid aqueous solutions into the stomach, and occasionally into the empty stomach. Later, Volhard and Faubel studied the occurrence of this phenomenon in man. Faubel observed the regurgitation of pancreatic juice in 70 per cent. of the cases that he studied, and thinks that, but for some technical inaccuracy in his method, the percentage would have been higher. Volhard found regurgitation in 86 per cent. of the cases he studied. He was, moreover, able to make use of the results of the test for clinical purposes, excluding, on the basis of a positive test, a carcinoma of the pancreas in a case of severe icterus, and a pancreas achylia in a case of lientery associated with atrophy of the intestinal mucosa. In the third case of severe diabetes, in which the test was negative, the clinical diagnosis of atrophy of the pancreas was substantiated by autopsy.

Molnar¹ has undertaken a further study of the frequency of this

¹ Zeitsch. f. klin. Med., 1909, vol. lxxvii, p. 188.

regurgitation. He examined fifty patients suffering with various diseases, introducing, by means of the stomach tube, 200 c.c. of olive oil into the empty stomach, and removing the stomach contents half an hour later. The oil was, without exception, well borne by the patients. On removing the stomach contents, more or less of the oil was regained, together with a varying amount of either viscid or thin fluid, varying in color from white to dark green. On standing for a few minutes, this fluid settled to the bottom of the glass, separating itself sharply from the overlying oil. This fluid was then studied as to its contents of free hydrochloric acid, pepsin and trypsin, and its total acidity. The bile content could be estimated only relatively by the depth of the color.

In 48 out of the 50 cases studied (96 per cent.), the presence of trypsin could be demonstrated. The two patients in whom regurgitation did not occur suffered from pyloric stenosis. The resistance offered by the stenosed pylorus to the entrance of substances from the duodenum into the stomach apparently explained the absence of regurgitation in these cases. However, the absence of regurgitation cannot unconditionally be interpreted as characteristic of pyloric stenosis. In the first place, others have failed to find regurgitation after the introduction of oil; and secondly, Molnar himself has, in his series of cases, two other instances of pyloric stenosis in which the regurgitation did occur. In this connection, one other possibility must be considered, namely, infiltration of the pylorus to such a degree as to result in practical rigidity; so that, though there is stenosis of the pylorus, there may also be a high degree of regurgitation from the duodenum into the stomach. Einhorn has described such a case, and Molnar has observed a similar one, the diagnosis of which was substantiated at operation. In both of these cases there was hyperacidity associated with marked vomiting of bile-colored material.

Molnar remarks upon the unexpectedly high values in tryptic content manifested by patients with gastric carcinoma. This fact may stand in some relationship to an observation by Reisner, who found the chlorides in the stomach contents of patients suffering with gastric carcinoma to be extremely high. He explains this phenomenon on the basis of the neutralization of the hydrochloric acid present and the high chloride content of the juices secreted from the tumor. In non-carcinomatous cases he found the chloride content of 100 c.c. of gastric juice to be equivalent to from 24 to 42 c.c. of a decinormal silver solution; whereas, in cases of carcinoma of the stomach it rose to between 50 and 60 c.c.

In patients with gastropotosis, also, Molnar found high tryptic values in the stomach contents. He explains this on the basis of the fact that while in normal individuals the pylorus is the lowest part of the stomach, in gastropotosis the greater curvature is the lowest part; and this condi-

tion favors the regurgitation. In other words, the factors that increase the difficulty of emptying the stomach favor regurgitation.

In cases of ulcer of the stomach, Molnar obtained very low tryptic values. This finding does not support Boldyreff's hypothesis that the regurgitation of bile and pancreatic juice is a probable etiological factor in gastric ulcer. It is possible that the tryptic content may have been somewhat decreased in these cases by the high degree of gastric acidity present; but, on the other hand, the bile content was low, and this is not subject to the same influence of hydrochloric acid. In patients with hyperacidity, the tryptic and bile content was, in general, low; though in one case high values were found. Similarly, in diabetes, low values were, in general, obtained; though in one case a relatively high tryptic content was found.

Molnar, in classifying his cases, observed the rather interesting fact that there was apparently a sort of antagonism between the peptic and tryptic values of the contents after the administration of oil. In other words, the amount of pepsin varied inversely as the amount of trypsin. He found, moreover, that there was a direct proportion between the tryptic content and the bile content, as measured by the depth of the green color imparted to the fluid. In those instances in which the fluid was colorless, or almost colorless, the tryptic content was found to be extremely small; whereas, those cases in which there was a deep green color presented the highest tryptic values. Molnar, unfortunately, had no cases of suspected occlusion of the duct of Wirsung to study; but he thinks that this is the type of case in which the test may be expected to be of especial assistance in diagnosis.

Lewinski¹ studied 29 subjects by introducing 150 c.c. of olive oil and removing the stomach contents three-quarters of an hour later. Two of his cases were unsuitable for use in determining how frequently the phenomenon of regurgitation occurs in man. Of the remaining 27 cases, 19, or 70 per cent., showed more or less trypsin in the stomach contents. Lewinski takes a somewhat different attitude from that taken by Boldyreff in regard to the reaction of the gastric contents and its influence on the regurgitation.

Boldyreff found regurgitation to occur much more constantly when a strongly acid reaction prevailed in the stomach, and he, consequently, added oleic acid to the olive oil before introducing it into the stomachs of dogs. Lewinski found an alkaline reaction to be more conducive to the regurgitation. He, consequently, administered a half teaspoonful of *magnesia usta* twenty minutes after the introduction of the oil. When he followed this procedure he was able to demonstrate the presence of trypsin in the remaining 8 cases, in which he had found none after the introduction of the oil alone; so that, with the exception of the 2

¹ *Deutsch. med. Woch.*, 1908, vol. ii, p. 1582.

cases to be considered later, the statistics rose to 10 per cent. One of the 2 cases in which no bile or pancreatic juice was found after the introduction of the oil was diagnosticated as occlusion of the common bile duct and pancreatic duct by stone. This diagnosis was apparently substantiated by the autopsy findings. The other case was one of hour-glass stomach. Subsequent operation showed the stricture, located about the middle of the stomach, to be of such a degree as to barely permit of the introduction of the small finger. As a result of these observations, Lewinski thinks that a negative result of the administration of an oil meal may indicate either occlusion of the pancreatic and bile ducts or an obstruction to the flow of contents from the duodenum into the stomach. In certain circumstances it may also be looked upon as suggestive of an hour-glass stomach.

The Pancreas in Hepatic Cirrhosis. Poggenpohl¹ has made an extensive study of the pancreas in cirrhosis of the liver. Previous studies by a number of observers have led to varying results. Some have found only interlobular fibrosis of the pancreas; others, intralobular fibrosis, and others, both interlobular and intralobular changes. Similarly, various changes have been described in the parenchyma and in the islands of Langerhans. Poggenpohl bases his results on the study of the organs of twenty-four human subjects dying of cirrhosis of the liver, and of numerous experimental animals in which the early stages of cirrhosis were produced by the feeding of small amounts of butyric acid.

His conclusions are as follows: The reports in the literature concerning pancreatic lesions in cirrhosis of the liver are confusing and often contradictory. The cause of this undoubtedly lies in the fact that the majority of observers have studied so few cases as to make it impossible to differentiate between the constant and the purely accidental changes. His own studies have shown changes characteristic of chronic inflammation in the pancreas in all cases of cirrhosis of the liver. This chronic inflammation, or fibrosis, is intralobular in all instances, and also interlobular in a few. The intralobular connective tissue surrounds either single acini or groups of acini. It also surrounds the islands of Langerhans and occasionally sends branches into the substance of the islands. The parenchymatous changes in the pancreas stand in direct relationship to the degree of the interstitial changes, and manifest themselves through more or less extensive atrophy or fatty degeneration of the cells; and occasionally, in alterations of the acinous structure of the gland, as the result of these degenerations and the fibrous new-growth. In the majority of cases the islands of Langerhans appear normal. If, however, they are involved in the inflammatory process, the proportion of those involved is small as compared with those remain-

¹ Virchow's Archiv, 1909, Band 196, Heft 3, p. 466.

ing unaltered. In liver cirrhosis accompanied by disturbances in cardiac compensation, small hemorrhages are frequently seen in the islands of Langerhans. The intensity of the interstitial changes in the pancreas is not always parallel with the degree of the changes in the liver.

In all the cases studied the connective tissue in the pancreas seemed older than that in the liver. The changes in the pancreas were not essentially different in atrophic cirrhosis from those present in hypertrophic cirrhosis. The starting point of the changes in the pancreas seems to be about the excretory ducts, which manifest changes characteristic of a catarrhal inflammation. Very seldom does the fibrous newgrowth follow the course of the vessels.

The changes in the pancreas in liver cirrhosis speak for the enterogenous origin of the latter. This view is, moreover, confirmed by the findings in experimental liver cirrhosis. By inducing a chronic intoxication in rabbits, by means of small doses of butyric acid, the early stages of a liver cirrhosis can be developed. Manifestations of a subacute catarrhal inflammation appear in the gastro-intestinal tract and in the excretory ducts of the pancreas in these animals. Subsequently, the tendency to fibrous newgrowth along the course of these ducts is noted.

Test for Trypsin in the Feces. Gross¹ publishes a new method that he has devised for estimating the functional activity of the pancreas by determining the presence of trypsin in the feces. The method is based on the fact that casein rendered soluble in alkali is precipitated on the addition of acetic acid, while the products of its digestion remain in solution. For fecal examination, one dissolves 0.5 gram caseinum purissimum (Grubler) in 1 liter of 1 to 1000 soda solution, warming moderately. The feces to be examined are rubbed up in a mortar with three times the quantity of 1 to 1000 soda solution, until a homogeneous suspension is obtained, and then filtered until the filtrate is clear. Usually this is very quickly accomplished; but if bacteria cause turbidity, they will settle to the bottom in a short time, and the clear fluid may be decanted.

One hundred c.c. of the casein solution is placed in a flask, and 10 c.c. of the fecal suspension added. This mixture is shaken and placed in an incubator at 38° to 40° C.; and small quantities are withdrawn from time to time and tested with 1 per cent. acetic acid until a precipitate no longer occurs.

Employing this technique, over 200 stools from patients without demonstrable pancreatic disease were examined, and a proteolytic ferment was found in all. A few drops of chloroform were added to prevent bacterial growth, and the probability that the ferment was trypsin was further shown by the failure of digestion after the addition

¹ Deutsch. med. Woch., 1909, vol. xxxv, p. 706.

of 0.5 c.c. of human blood serum (antitrypsin). Erepsin was practically excluded by removing the pancreas of dogs and finding that the feces then failed to digest the casein. In the 200 cases studied, the time required for complete digestion varied from eight to thirty hours. The rapidity of digestion and, therefore, according to Gross, the amount of trypsin varied with the character of food given the patient. Digestion was most rapid after proteid; next, after fat; and slowest after carbohydrate food. A proteid diet is, therefore, recommended before performing the test. The average time for digestion while the patient is on a proteid diet, Gross found to be between twelve and fourteen hours. In various intestinal disorders he found normal tryptic digestion, except that in diarrhea the casein was digested unusually rapidly. In one patient with complete closure of the ductus choledochus, no tryptic digestion was demonstrable. A similar result was obtained in a case of cancer of the pancreas; and in this case absence of pancreatic juice was the only definite sign of pancreatic disease. In a patient with sclerosis of the pancreas and the clinical picture of pernicious anemia, normal tryptic digestion occurred.

Cambridge's Test. Roth¹ performed the Cambridge test in 32 patients, suffering with various diseases. He obtained a positive result in 3 cases of pancreatic disease. One of these was a tumor of the head of the pancreas, of undetermined nature, in a patient who had long suffered with obstruction of the common duct. The second case was evidently one of chronic pancreatitis; and the third, apparently a case of pancreatic lithiasis. In a fourth case, in which the test was positive, the autopsy revealed a very considerable degree of atrophy of the pancreas, associated with carcinoma of the liver. The reaction was, moreover, positive in 3 cases of carcinoma of the stomach, 1 case of syphilitic cirrhosis of the liver, 1 of catarrhal jaundice, 1 of cholelithiasis, 2 cases of diabetes, 1 case of croupous pneumonia, and 1 of myelogenous leukemia. The result was negative in 1 case of diabetes, 1 of catarrhal icterus, 1 of cholelithiasis, and several other indifferent cases. In addition to these 32 cases of disease studied by Roth, he performed the test on 10 normal healthy individuals. It was negative in 8 of these and positive in 2.

As a result of his experience with the test, Roth thinks that it is usually positive in primary disease of the pancreas. In secondary disease of the pancreas it is at times positive and at times negative. The fact that he has obtained positive results in a number of cases in which the pancreas was evidently not diseased destroys almost all the value that the reaction might acquire by reason of its being positive in diseased cases. He looks upon it as one that cannot play much of a role at present in the diagnosis of pancreatic disease.

¹ Zeitschrift f. klin. Med., 1909, vol. lxxvii, p. 222.

Schroeder,¹ on the basis of a study of 85 cases, including both pancreatic and non-pancreatic diseases, comes to the following conclusions.

1. It has been proved that inflammatory and destructive disease of the pancreas may give rise to the appearance of certain as yet undefined bodies in the urine, belonging possibly to the sugars or related compounds.

2. The reaction is not pathognomonic of disease of the pancreas in the clinical sense. Extensive clinical observations on the urine in pancreatic and other diseases must finally determine the value of the pancreatic reaction.

Deaver² expresses himself as follows: "The reaction discovered by Mr. Cammidge I believe to be an aid in the diagnosis of pancreatic disease. It is true that the originator and his collaborators have been able to get more positive results from its use than others, but it has been found of value in many cases. I am inclined to regard it, for the present, in the hands of most investigators and laboratory workers, at least, as a fairly constant sign of pancreatic disease, rather than of great value in the differential diagnosis."

Ochsner,³ in an article on the diagnosis of pancreatitis, makes the following remarks in regard to the Cammidge reaction: "In 1905 my assistant, Dr. J. L. Yates, a thoroughly trained laboratory expert, who had also great experience in clinical surgery and surgical pathology, applied the Cammidge test most carefully to a large number of surgical cases in our care in the Augustana Hospital. The study proved extremely fascinating, but did not lead to practical results. This was probably due to the fact that we demanded evidence not requiring a personal element. We were, however, convinced that the method contained merit and should be encouraged. Since that time a few investigators have had results corresponding with those of Cammidge, which have been most brilliant in the estimation of such keen observers in the surgical profession as Robson and Moynihan. Most interesting of these are the observations of Eloesser, which are set forth in a scholarly review of sixteen cases.

"Other observers have obtained positive reactions in many cases in which the pancreas was proved to be normal at subsequent operation, while a negative reaction was found in some cases in which chronic pancreatitis was later demonstrated to be present. From these facts, it seems plain that further development is necessary before the test can be generally employed, but that the method should not be discarded, because it certainly contains scientific value, especially in the hands of investigators trained in the observation of most delicate chemical reactions."

¹ Journal of the American Medical Association, 1908, vol. ii, p. 837.

² Ibid., p. 374.

³ Surgery, Gynecology, and Obstetrics, 1908, vol. vii, p. 621.

Krienitz¹ credits the reaction, with somewhat more reliability, as is shown by his conclusions;

1. In about 80 per cent. of the cases the Cammidge reaction has been in accord with the findings at operation.

2. The reaction is positive in various diseases of the digestive tract and the biliary tract, in diabetes, and in carcinoma of other organs. Whether the positive reaction in these cases is to be interpreted as an indication of actual disease of the pancreas or not, only future observation can tell.

3. The Cammidge reaction is a valuable test for the surgeon in determining the condition of the pancreas in diseases of the liver and bile ducts. It is not improbable that further investigation will make it of diagnostic, prognostic, and therapeutic aid in medicine. Even now it is a valuable method in certain cases, and is worthy of the greatest attention and further investigation.

Probably the most favorable opinion of the value of the Cammidge reaction is given by Goodman,² whose conclusions are as follows: "Of 62 cases studied, but 10 gave a positive reaction. In 7 of these the diagnosis was confirmed by operation or autopsy. One case died with all the clinical symptoms of acute pancreatitis, and in the other 2 a concurrent pancreatic lesion was not improbable. In no case other than those presenting clinical evidence was a positive reaction obtained.

"I firmly believe the test to be a very useful one, and to mark a decided advance in the diagnosis of pancreatic disease. The technique is long and complicated, and requires great care; but is one that can be readily mastered, and is within the scope of any clinician with facilities for laboratory work. Sometimes the end-reaction is obscure, on account of crystals forming which are not properly the osazon described by Cammidge; but observation as to structure and their insolubility in 33 per cent. sulphuric acid suffices to render the diagnosis less difficult.

"The test is not pathognomonic, and the discoverer himself has never had the temerity to claim this property for it; but, taken in connection with the clinical history and examination, and a careful study of the feces, the Cammidge reaction is strongly suggestive of inflammation of the pancreas."

Subsequently, Speese and Goodman³ published the accounts of a series of experimental observations on the value of the Cammidge reaction. Their observations were made on dogs, and included the following pancreatic conditions: Acute pancreatitis, chronic pancreatitis, mechanical crushing of a portion of the pancreas, and partial and total extirpation of the pancreas. Seventeen dogs in all were studied. Acute

¹ *Archiv f. Verdauungskrankh.*, 1909, Band xv, Heft 1, p. 53.

² *Annals of Surgery*, 1909, vol. xlix, No. 2, p. 183.

³ *American Journal of the Medical Sciences*, 1909, No. 448, p. 108.

pancreatitis was produced by injecting oil into the pancreatic duct; and chronic pancreatitis, by ligating the duct. The urine was naturally studied both before and after operation. The conclusions of the experimenters are:

1. The Cammidge reaction is a constant feature in hemorrhagic pancreatitis, in mechanical injuries of the gland (crushing of the tail, partial extirpation), and in total extirpation.

2. In certain cases of the subacute type of pancreatitis the reaction is inconstant.

3. The nature of the phenylhydrazin compound is not definitely established. If pentose, it is apparently not derived from the pentose-yielding material of the pancreas.

4. A positive reaction is indicative of altered carbohydrate metabolism due to disturbance of the internal secretion of the pancreas.

Personally, from a study of the literature during the time that the test has been known and especially from the studies, as yet unpublished, of some of my colleagues on the chemical changes occurring in the reaction and on the nature of the reaction, I am forced to a skeptical attitude regarding its usefulness, and never place any reliance upon results that it has given in cases that I have seen.

DISEASES OF THE KIDNEYS.

BY J. ROSE BRADFORD, M.D., F.R.C.P., F.R.S.

The Experimental Production of Nephritis. There is still much obscurity as regards the etiology of chronic nephritis, and especially with regard to its relation, if any, to so-called acute nephritis. The investigation of this question from the clinical side presents great difficulties, inasmuch as in such a large proportion of cases of chronic renal disease the onset is so insidious that the malady is not detected until it is far advanced. Further, the onset of acute symptoms does not necessarily imply the occurrence of acute disease, and in chronic nephritis it is by no means uncommon for symptoms such as dropsy to arise suddenly, and for the patient, and sometimes for the practitioner, to be under the impression that the malady is of acute origin when such is not the case.

No doubt, in a certain proportion of cases of well-marked chronic nephritis, a history of acute infection, followed by a sudden development of urinary symptoms, may be elicited, but in a very large proportion of cases no such history is obtainable, and the etiology of the affection is obscure. But, at any rate, it would seem that in a large number of instances there is no reason for believing that any acute nephritis has necessarily preceded the chronic affection.

An additional difficulty presents itself inasmuch as acute nephritis may undoubtedly occur without the development of any very marked symptoms, provided dropsy be absent, as is not infrequently the case. Thus, although a history of acute nephritis may not be obtained in any given case, yet it is difficult and often impossible to exclude the possibility of its occurrence. All these difficulties make it all but impossible to settle with certainty the relationship of acute and chronic nephritis to one another, if attention be concentrated only on the clinical phenomena. Not only have there been endless controversies with regard to the relationship, if any, existing between acute and chronic nephritis, but somewhat similar differences of opinion have also existed with regard to the relationship between the different varieties of chronic nephritis and more especially between such extreme instances as the large white kidney, on the one hand, and the contracted granular kidney on the other. Some writers have thought that one variety of the contracted kidney, namely, the small white kidney, might be a terminal stage of certain varieties of the large kidney, just as the large white kidney is looked upon by these as the result of a former attack of acute nephritis.

Others—and perhaps with more reason—regarded the contracted white kidney as the sequel of an acute nephritis without the necessary intervention of the large white kidney as a stage in the process. Some even took the view that the so-called large white kidney might be the result of an acute exacerbation of a pre-existing chronic contracted kidney.

The number of instances in which the contracted white kidney is known to occur, where a patient has not presented any signs or symptoms of any previous renal illness, has led many observers, including the writer, to the belief that this affection was an independent one and not necessarily the sequel of any previous renal disease.

It will be seen from this short summary that the confusion in the classification and the interrelationship of the different forms of nephritis is very great.

A further problem presents itself in the fact that it is possible that a kidney, damaged by an attack of acute nephritis, may suffer from lesions which are essentially non-progressive and rather of the nature of healed lesions. Thus, for example, a persistent albuminuria may be seen to follow an attack of nephritis, and persist for long years without the development of any other symptoms characteristic of renal disease. But such a damaged kidney may be less resistant to toxic or other influences than a normal organ, and thus, subsequently, exacerbations may take place from time to time, leading ultimately to the production of permanent, or progressive, and serious disease. In some instances of chronic nephritis, as seen in the human subject, a long period of quiescence may have been present between the original infection and the first development of symptoms pointing to the existence of chronic renal disease.

Not only is there much confusion with regard to the relationship existing between different forms of chronic nephritis, but there is also much doubt, even at the present time, as to the exact nature of the cause of chronic nephritis. Toxic substances have long been recognized as the cause of acute nephritis, and clinical observation showed long ago that such bodies as cantharides and turpentine, to mention only two, were capable of causing well-marked acute nephritis in the human subject, presenting many points of resemblance to the nephritis seen after acute infections, and especially after scarlet fever. It has also long been recognized that chronic poisoning with lead produces in the human subject well-marked renal lesions as part and parcel of the widespread changes produced by this poison. But, notwithstanding these definite facts, the etiology of nephritis, and especially of chronic nephritis, was, and is still to some extent, attributed to very general causes, *e. g.*, cold; and it is only quite recently that the great part played by toxic agents in the production of renal disease is beginning to be appreciated. Experiments in the laboratory have shown the existence of a very large number of substances capable of causing nephritis of varying types and of varying

degrees of severity; some producing effects which are most marked on the glomeruli and the vessels, and others reacting more on the tubular epithelium. Great difficulties, however, have been experienced in producing any condition at all analogous to that seen in chronic nephritis.

In 1904 I attempted to produce chronic nephritis by the injection of bichromate of potash into the renal artery on one side, with the idea of damaging, to a greater or lesser degree, the epithelium of one kidney, and so to observe whether the destruction of the epithelium was necessarily followed by an overgrowth of fibrous tissue. The experiments were completely successful in so far that the epithelium of one kidney could be destroyed without materially damaging that of the opposite kidney. But, although the kidney operated on underwent atrophy, there was no overgrowth of fibrous tissue, and no condition at all analogous to that seen in chronic nephritis was produced. The conclusion was therefore drawn that a chronic lesion was not the necessary sequel of an acute nephritis; in other words, that a chronic, progressive lesion would not develop necessarily as the result of the action of a toxic agent on a single occasion.

A large number of other observers investigated the action of different poisons on the kidney, and, although some increase of fibrous tissue was observed by Lyon in the kidneys of animals poisoned by a corrosive sublimate, yet even he failed to produce a lesion at all analogous to that of chronic nephritis. Ehrlich and Levaditi were able to produce fibrosis of the kidney with the action of vinylamine, and Ophüls also obtained sclerosis of the kidney by giving animals carbonate and acetate of lead. Emerson obtained varying degrees of chronic nephritis in dogs as a result of the repeated inhalation of ether, alcohol, chloroform, and amyl nitrate.

But one of the most complete and recent investigations on this subject is that by Dickson,¹ who used *uranium nitrate*, a substance that Richter had shown was capable of producing a condition in animals analogous to Bright's disease. The uranium nitrate was given by subcutaneous injections. In one series of experiments, 0.25 mg. of uranium nitrate was given subcutaneously in repeated doses spread over a period, in some instances, as long as 120 days, and as many as eighty-seven separate doses were administered. In this way it was hoped to produce a mild, long-continued chronic poisoning somewhat analogous to that induced by the supposed etiological factors concerned in the production of the granular kidney. In another series of experiments 2.5 mg. of uranium nitrate were given at intervals of from ten to thirty days. In this series the dose was sufficient to produce a definite nephritis. Finally, in a third series of experiments, 5 mg. of uranium nitrate were given, being a dose sufficient to cause severe nephritis which, in some instances, was followed by death.

¹ The Archives of Internal Medicine, June, 1909, vol. iii, Nos. 5 and 6.

7 The general results of Dickson's experiments were that by the use of uranium nitrate it is possible to produce in animals lesions very similar to those found in man. One of the most interesting results was that the long-continued administration of small doses of the drug was followed by the production of an interstitial nephritis which the author thought might be progressive. Where larger doses of uranium nitrate were employed, so that the animal suffered from several attacks of subacute nephritis, these resulted in extensive fibrotic changes in the kidney, and in some instances the organ became granular, and this was associated clinically with the occurrence of polyuria. Lastly, where a single dose was employed, producing a severe attack of acute parenchymatous nephritis, this might be followed by the production of fibrosis and even extreme granular atrophy.

In the cases where large doses were employed, so that an acute nephritis was produced, the lesions were most marked in the convoluted tubules and the ascending limbs of the loops of Henle. The epithelium lining these tubules underwent degeneration, and the tubules contained exudate and desquamated cells. The ascending limbs of Henle's tubes were the earliest affected, and showed marked degeneration at a time when the cells of the convoluted tubules only showed slight changes. The epithelium of the collecting tubules showed no degeneration, although the tubules themselves contained exudate and debris. The glomeruli showed slight congestion and some exudation into the intrascapular space, and there were also some changes in the interstitial tissue in the form of a round-celled infiltration. Dickson draws especial attention to the fact that in the acute poisoning the more serious lesions are those in the tubules, and that there is but little change in the glomerular tuft and capsule.

In the cases where small doses of uranium nitrate were given over a long period of time, very distinct effects were produced in the kidney. The glomerular tufts were dilated, and, although many of the glomeruli were apparently normal, there were always some where the capsules had undergone thickening, and where hyaline degeneration of the basement membrane and some proliferation of the endothelial layer were present. In some instances the glomerular capsules became cystic, and in all cases the epithelium of the tubules underwent some degeneration and atrophy, and the tubules became dilated and their lumen occupied with exudate and desquamated cells. These changes in the tubules were not uniformly distributed, and the areas of degeneration were most marked in the vicinity of the glomeruli that were most damaged. Areas of round-celled infiltration were uniformly present, especially near the larger veins of the inner margin of the cortex. In two instances there was definite fibrosis of the medullary rays, and Dickson is of opinion that the long-continued, mild intoxication with the uranium nitrate was producing a commencing fibrosis of the kidney. He was

unable to determine whether this was accompanied by any cardiac hypertrophy. In several instances the urine was albuminous, and in two instances granular casts were present in addition.

In the remaining series of experiments, where medium doses of uranium nitrate were employed, sufficient to produce a definite attack of mild nephritis, still more marked lesions were found. Albuminuria was usually present, and the animals lost weight, and polyuria was observed in two instances, and numerous granular casts were also found. On microscopic examination the interstitial connective tissue of the kidney was markedly increased, and distinct dimpling of the surface of the kidney was present. The overgrowth of fibrous tissue was usually diffuse. The glomerular capsules were distinctly thickened, and hyaline degeneration of the basement membrane, together with proliferation of the endothelium, were always present, and in some instances there was a marked increase of the connective tissue of the tuft. The convoluted tubules presented also marked changes, such as atrophy, together with dilatation of the tubules and degeneration of the epithelium. The collecting tubules showed comparatively little change. Newly formed elastic tissue was found around the damaged glomeruli outside the thickened basement membrane, and it seemed to be continuous with the elastic tissue in the cells of the small arteries.

Dickson points out that the results obtained in this group of experiments show that a series of subacute attacks of nephritis, produced by the uranium nitrate, lead to very marked and permanent changes in the kidney, and that the increase in the interstitial tissue and the marked tubular and glomerular changes resemble very closely the morbid appearance of chronic interstitial nephritis in man.

Further, the results obtained with a single large dose of uranium nitrate show definitely that a single attack of parenchymatous nephritis may so damage the kidney as ultimately to lead to the production of an atrophic granular kidney. Dickson also draws attention to the fact that in all the cases where chronic lesions were produced the glomerular changes were very marked. This is remarkable, inasmuch as but few changes are found in the glomeruli as the result of acute intoxication with uranium nitrate. Dickson considers that the glomerular changes are undoubtedly secondary to the damage done by the acute poisoning, and that these results bear out Senator's teaching, that the whole tube system may be damaged as a result of injury to any of its parts. These observations of Dickson's throw a considerable light on the etiology of chronic nephritis, and tend to confirm, with the certainty of experimental results, some of the conclusions which have long been hazarded from the clinical side.

The three most important results achieved are probably: (1) The proof that long-continued poisoning with small doses of such a substance as uranium nitrate will produce lesions analogous to those seen

in chronic nephritis of the fibroid type; (2) that a single attack of acute nephritis may, under certain circumstances, lead to the development of a fibroid kidney; and (3) that repeated attacks of subacute nephritis may unquestionably lead to the development of chronic interstitial nephritis.

Pearce¹ has also studied the effects of uranium nitrate on the production of edema. Uranium nitrate not only produces nephritis when administered to animals, but if at the same time considerable quantities are administered so as to produce a condition of hydremia, marked edema of the subcutaneous tissues and of the pleural and peritoneal cavities ensues. This observation shows strikingly the complex nature of the dropsy of kidney disease, since the renal lesion produced by uranium nitrate is not of itself sufficient to lead at once to the development of dropsy to any marked extent. But when a condition of hydremia is produced, in addition to the renal lesion, then general anasarca, very similar to that seen clinically in renal disease, is produced. If the renal lesion be produced by other substances than uranium nitrate, *e. g.*, chromates, artificially induced hydremia will not necessarily lead to the production of dropsy. Hence it would seem probable that the uranium nitrate produces effects not only on the renal structures, but also on the bloodvessels of the body generally, and it is as a result of these that the hydremia is able to lead to the production of generalized dropsy. Other poisons acting on the vascular system, such as ricin, snake venom, arsenic, if administered to an animal with nephritis, in whom a condition of hydremia has been artificially produced, will result in generalized dropsy.

It would seem from these results that, in the pathology of renal dropsy, three factors have to be taken into consideration—the renal lesion; the lesion, or, at any rate, changes in the vessel walls; and the existence of hydremia. All these three factors are necessary for the production of dropsy in kidney disease, although it is very probable that the toxic agent which causes the renal lesion, in many cases of nephritis in the human subject, is also the toxic agent that damages the vessel wall. Clinical observation has long ago shown that the development of dropsy in renal disease cannot be correlated simply with the severity of the renal lesion. Thus, not only may no dropsy be produced where complete suppression of urine recurs as a result of some disease of the kidney other than nephritis, but even in cases of severe nephritis, associated with complete suppression of urine, dropsy is by no means necessarily present. On the other hand, other cases are seen where generalized dropsy of great severity is present, and yet where the renal lesion is not necessarily so severe as that seen in other instances of nephritis unaccompanied by dropsy. These clinical results are completely paralleled by the results obtained in the laboratory, where a nephritis of varying degrees of

¹ Archives of Internal Medicine, vol. iii, Nos. 5 and 6

severity may be produced by the action of toxic agents, in some cases accompanied by dropsy, *e. g.*, the nephritis of uranium nitrate; in other instances, *e. g.*, that produced by chromates unaccompanied by dropsy.

Further, some observers have obtained very striking results by the injections of the serum of animals suffering from uranium nephritis. Such serum, injected into hydremic animals poisoned with chromates, led to the development of edema, and it is probable that the serum contained substances having an injurious action on the vascular endothelium. Pearce is of opinion that hydremia and injury to the endothelium of the vessels are factors of equal importance with nephritis in the production of anasarca, and that it is probable that dropsy will not occur in any given case unless the three factors of nephritis, vascular injury, and hydremia are present.

Leukocytosis in Renal Disease. Renon and Moncany¹ have conducted a series of observations on the prognostic significance of leukocytosis in renal disease, and more especially in chronic nephritis. These authors conducted their observations both on animals in whom nephritis had been produced by the injection of serum, and also in the human subject in ten cases of nephritis. The clinical results were more definite than the experimental, although in the latter the albuminuria was accompanied with a leukocytosis which disappeared at the same time that the albuminuria cleared up. In cases of nephritis in the human subject, the degree of the leukocytosis varied with the severity of the renal lesion. But there was no direct relationship discovered between the quantity of albumin and the number of leukocytes, although the latter underwent a diminution when the albuminuria diminished or disappeared. Thus, in one case of interstitial nephritis in a painter, and accompanied by marked increase of arterial tension, there were 8000 leukocytes per cm. at a time there was no albumin. Subsequently, when the albuminuria reappeared and the arterial tension was higher, the leukocytes increased to over 13,000.

In cases of chronic nephritis of the usual type, with scanty urine and a high degree of albuminuria, the number of leukocytes may be as high as 16,000. In the albuminuria of pregnancy, which is often remarkable from the large amount of albumin that is present, the leukocytosis may be considerable, and in one instance observed by these authors the number was as high as 16,000. Yet, in a week, when the albuminuria had disappeared, and when there was no material change in the number of red blood corpuscles, the leukocytes had fallen to 6400. These authors found that in cases of nephritis of the most serious type, and terminating in uremia, the leukocytosis might be still more marked, and that at a time when uremic convulsions were present as many as 28,000 white cells might be present. They conclude from their observa-

¹ Société Médicale des Hôpitaux, January 21, 1909, No. 2.

tions that leukocytosis is nearly constant in both acute and chronic nephritis, and that it tends to disappear at a time when the albuminuria clears up. The leukocytosis is not proportional to the amount of the albuminuria, nor on the extent to which retention of chlorides is present, and the authors are of opinion that the leukocytosis is less marked in those forms of nephritis that are accompanied by edema.

The most important conclusion reached, however, is that the leukocytosis is most marked in the more serious forms of nephritis, and especially in cases of chronic nephritis where uremic complications are either present or imminent. It would thus seem that the extent of the leukocytosis may afford indications of value in arriving at a prognosis in cases of chronic nephritis. This is a conclusion of some interest, as all authorities are agreed that it is a matter of great difficulty to forecast at all accurately the probable course and the possibility of complications in chronic nephritis.

Stokes-Adams Symptoms in Uremia. Courtois-Suffit¹ reports an interesting example of Stokes-Adams symptoms in a case of uremia. The case was one of an elderly man, aged sixty-five years, who was admitted with the initial manifestations of uremia, the respiration being of the Cheyne-Stokes type, the arterial pressure 250 mm., and the urine contained a small quantity of albumin. The pulse was slow, only thirty-six beats to the minute. On the following day epileptiform convulsions occurred producing both cyanosis and loss of consciousness, and lasting half an hour, but unaccompanied by any biting of the tongue or incontinence of the sphincters. Two days later death occurred, and the lesions of chronic renal disease were present, together with marked degeneration of the bundle of His, and there was extensive fibrosis at the attachment of the mitral flaps. The interest of this case lies in the fact that the Stokes-Adams symptoms occurred during the uremic state, and, as the authors point out, such symptoms as the epileptiform seizures which are so characteristic of the Stokes-Adams syndrome would, prior to the modern knowledge acquired with reference to the bundle of His, have been attributed solely to the toxemia produced by the renal disease.

Further, it is possible that the epileptiform attacks that are so well known in association with renal disease may, therefore, in some instances have a primary cardiac rather than a primary cerebral origin; and they think that it is possible that such attacks may perhaps be due to functional disturbances of the bundle of His, brought about possibly as a result of the retention of the chlorides. The authors, in this connection, draw attention to a case recorded by Henriquez and Ambard,² where, as a result of treatment directed to diminish the intake of chlorides, the slow pulse present in a case of Bright's disease disappeared and regained its

¹ Société Médicale des Hôpitaux, February, 1909, No. 5

² Ibid., January 25, 1907.

usual frequency. In renal disease, however, cardiac degeneration is a very frequent accompaniment, and this, if involving the bundle of His, affords a ready explanation of the more serious and fatal cases presenting the clinical phenomena known as Stokes-Adams disease.

Orthostatic Albuminuria. Linossier and Lemoine¹ in a recent communication return to the question of the nature and cause of orthostatic albuminuria, a subject which, notwithstanding the large amount of work that has been done, is still a very obscure one. They regard orthostatic or postural albuminuria as only one of many modifications of the functional activities of the kidneys that may be induced by posture; and they consider that there are two questions to be investigated: (1) What alterations are produced in the functional activity of the kidney by the upright posture? and (2) why do these alterations produce albuminuria only in a small number of persons?

They conducted their observations not only on those suffering from postural albuminuria, but also on healthy subjects, and they point out that, although the upright posture produces but little change in the normal state, yet where the kidneys are not perfectly normal, the upright posture may produce a notable diminution not only in the quantity of urine excreted, but also in the quantities of urea, of chlorides, and of phosphates. They regard this condition of diminished excretion as a pathological state closely akin to, only of a slighter degree of severity than, that answerable for functional albuminuria. The diminution in the excretion of urea, phosphates and chlorides runs closely parallel to the diminution in the excretion of water. In health the effect of posture is such that in the upright posture there is a slight diminution in the excretion of water, but the urine excreted is rather more dense than normal, and the urea excretion is increased, as is also that of the phosphates. Where albuminuria is present the upright posture not only causes a far greater diminution in the amount of urinary water excreted, but the urea, phosphates, and chlorides are, in addition, notably diminished.

Many of these results may be observed not only where the upright posture is assumed, but even where the patient is kept in a sitting posture, and in cases of albuminuria the effect of the sitting posture, in diminishing the output of water, urea, chlorides, and phosphates, is very notable. In most instances of albuminuria the diminution in the excretion, under the influence of this change of posture, amounts, roughly speaking, to 15 per cent., but the authors record one case of a man, aged thirty years, who suffered from postural albuminuria, the sequel of an attack of acute nephritis, where the quantity of urine secreted, when the upright position was maintained, was only 13 per cent. of that secreted in the recumbent posture.

The effect of posture on the urinary secretion, in cases of disease of the kidney, is so marked that Cottet has advised the administration of

¹ Société Médicale des Hôpitaux, March, 1909, No. 11.

diuretics, especially in the recumbent posture, so as to get the greater effect produced by these drugs. The author points out that some observers have attributed the effect produced by posture on the quantity of urine as due to modifications in the rate of absorption from the alimentary canal produced by the upright posture, as, for instance, in cases of dilatation of the stomach it is quite possible that in the recumbent posture the onward passage of fluid, and hence absorption, would be assisted.

The authors have carried out a series of observations on the effects produced by posture on the urinary flow after a meal and during inanition. In healthy subjects the effect of the upright posture after a meal is to cause a slight diminution in the quantity of urine secreted. In cases where the kidneys are normal, but the stomach does not empty itself completely and rapidly, the upright posture after a meal causes a diminution in the urinary flow, which is not present during inanition, and thus is to be attributed to the stomach conditions and not to the state of the kidney. Where the kidneys are defective in their action, but the digestive system is normal, a meal may have little or no influence on the urinary changes produced by posture; but in a considerable proportion of cases where the kidneys are not perfectly normal, the repletion of the stomach increases the oliguria produced by the upright posture. The authors point out that a large number of diseases, where the symptoms or signs of renal involvement are slight, the study of the effects of posture on the urinary flow will often afford evidence that the activity of the kidneys is really less than normal. Thus, in cases of arterial sclerosis and lead poisoning, and in bronchitis, a notable diminution in the quantity of urine may be observed as a result of the maintenance of the upright posture; and they regard this physical sign as extremely suggestive of the presence of some slight derangement of the renal function.

It is remarkable that this postural oliguria which may be seen in so many instances of nephritis, even of a slight degree of severity, may be absent in cases of advanced interstitial nephritis. This the authors attribute to the fact that in such kidneys the organ is no longer a filter, but, as they put it, a leaking filter. The authors consider that these effects on the renal secretion are due either to the upright posture causing a fall of general blood pressure, or else to an impediment, produced by the upright posture, to the renal circulation. Potain is of opinion that the upright posture tends to lower pressure. It must also be borne in mind that any cardiac insufficiency that may be present may lead to the production of slight dropsy when the upright posture is assumed, and that this may be the cause of the diminished secretion of urine. This may be a factor of considerable importance, and also one that may have a bearing on the production of postural albuminuria, as it is well known that many of these latter cases manifest signs of cardiac weakness.

Further, the upright posture may produce some torsion of the renal pedicle, and especially of the renal vein, and in this way interfere with the renal circulation. Lastly, the authors are of opinion that the upright posture may influence the renal circulation adversely by causing lordosis, and, perhaps, in this way produce compression of the renal vein. Having thus ascertained that the upright posture may, in one or other of these several ways, affect the functional activity of the kidneys, the authors pass on to the consideration of the pathology of postural albuminuria, which they think may be due either to an increase in the circulatory disturbance normally produced by the upright posture, or else to the fact that the kidney becomes unduly sensitive to the circulatory changes. The circulatory disturbance may be one affecting especially the renal circulation, as, for instance, the congestion attributed to lordosis, and to undue renal mobility, or it may be a general one, as, for instance, a material lowering of arterial pressure. And the authors point out that it is especially patients with low tension who present notable changes in the blood pressure as the result of posture. Further, as Vanderwelden has shown, these effects are exceptionally well marked in all cases of postural albuminuria. In the postural albuminuria of adolescence, low tension, general asthenia, and not uncommonly slight dilatation of the heart are present.

Another factor of great importance is the degree to which the vasomotor mechanism responds to changes of posture. Under normal circumstances in the healthy this mechanism is extraordinarily delicate, and tends to neutralize the effects produced by gravity. But it is quite possible that in those suffering from postural albuminuria the vasomotor reflex is either not evoked, or else is produced with great slowness, and this may perhaps account for the disappearance of the albuminuria as the day goes on. Some writers have attributed the postural albuminuria to the blood being less coagulable and normal; and, further, it has been stated that cases of functional albuminuria could be cured by the administration of lime salts. Linossier is, however, of opinion that this therapeutic effect of lime has not been confirmed by experience. On the other hand, there can be no doubt that, in a large number of cases of postural albuminuria, a slight renal lesion is present. Thus, numerous cases have been recorded where a postural albuminuria occurs during the course of the subsidence of an attack of nephritis, and some cases are known where postural albuminuria has preceded a genuine nephritis. Teissier and others have stated that postural albuminuria occurs not infrequently in the early stages of tuberculosis, and it is possible that here the effect is due to a toxic action of the bacillus on the renal structures.

The authors conclude by regarding postural albuminuria as essentially dependent on two factors: (1) A slowing of the renal circulation induced by the upright posture, and (2) a renal lesion of a slight degree

of severity. Achard is inclined to attribute considerable importance to the stagnation of blood in the vena cava as a result of the upright posture. Dufour has drawn attention to the readiness with which fixation of the kidney, either by a belt or by operation, may lead to the disappearance of a functional albuminuria. This again is a strong argument in support of the view that the albuminuria is dependent on a congestion of the kidney brought about by kinking in the renal vein.

Syphilitic Nephritis. Barth and Michaux¹ record a case of a woman, aged twenty-eight years, suffering from syphilis contracted two months previously, and presenting, at a time when she was under observation, well-marked signs of nephritis. The deposit, obtained from the urine by centrifugalizing, was examined, after fixation, with absolute alcohol, and stained by the method of Giemsa, with the result that the *treponema pallidum* was detected. This observation is of great interest, as the diagnosis of syphilitic nephritis is by no means easy. Sometimes it can be hazarded, owing to the presence of other well-marked signs of specific infection. In some instances the character of the urine, and especially the very large amount of albumin present, may afford a clue; and in others the beneficial effect of mercurial treatment may clear up a doubtful diagnosis. There can be little doubt that syphilitic nephritis is very much more common than is usually thought, and that many cases attributed to cold are really of specific origin, and the detection of the *treponema* in the urine would afford a convenient means of diagnosis in these cases.

Pyelonephritis. The results of infection of the urinary tract with organisms of varying degrees of virulence, such as the *Bacillus coli*, streptococcus, staphylococcus, are still very imperfectly recognized, although the clinical pictures produced by these maladies are becoming more definite as a result of further study. The nomenclature of the renal disease produced by such organisms present some difficulty; formerly such terms as surgical kidney, acute interstitial nephritis, infective nephritis were applied to the condition, but these are all open to objection, more especially the last, as it is very probable that all forms of nephritis are in reality infective in origin. Hence the term pyelonephritis is in all probability the one most suitable for adoption, although this also is open to criticism.

The relative extent to which nephritis or pyelitis respectively is developed in any given case depends much on the mode of origin of the disease, whether the renal lesion is the result of a so-called ascending or of a descending infection, for instance; notwithstanding this objection, the term pyelonephritis is on the whole the most suitable.

Eisendrath² discusses the different clinical manifestations of this affec-

¹ Société Médicale des Hôpitaux, July, 1909, No. 26.

² American Journal of the Medical Sciences, February, 1909, No. 443.

tion, which is rather apt to assume a protean type and therefore to mimic other diseases, or even to produce in some instances such slight symptoms as to be entirely overlooked. Eisendrath considers that from the point of view of etiology the cases should be divided into two groups: (1) The *urogenous* type, where the infection is an ascending one from the lower urinary tract, and (2) the *hematogenous*, where the infection is more localized to the kidney and where these organs are affected primarily through the blood. In the first group, *i. e.*, the urogenous, cystitis, obstruction to the flow of urine along the ureter, and fistulae between the ureter and such a structure as the rectum, are the most common factors of importance. Cystitis alone does not necessarily lead to the production of pyelonephritis and doubtless normally the back flow of urine up the ureter from the bladder is prevented by the sphincter-like action of the muscular tissue surrounding the ureter at its entry into the bladder. Loss of contractile power in the vesical wall, enlargement of the prostate, stricture of the urethra, may all lead to imperfect action of the ureteral sphincter and so favor the development of an ascending infection.

Obstruction to the flow of urine may lead to the development of an ascending infection in at least two ways. Bond's observations, as recorded in his address in surgery, delivered at the Leicester meeting of the British Medical Association, in 1905, showed that when any obstruction to the onward flow of liquid occurred in a duct, solid particles could be carried in a direction the reverse of the normal current. In this manner partial obstruction of the ureter would favor the development of an ascending infection and might lead to the development of pyelonephritis in cases where bacillemia existed without the presence of cystitis or of any inflammation of the lower urinary tract. Obstruction, partial in degree, may also, however, cause the development of pyelonephritis by causing some stagnation of urine and thus lead to the production of a renal inflammation in cases where the infecting agent reaches the urine from the blood stream. Thus a slight degree of ureteral obstruction may cause the development of either urogenous or hematogenous pyelonephritis. In the hematogenous type the renal lesion may be either primary or secondary; in the former the renal lesion is the only one found, and it is assumed that the infecting organism has gained access to the blood and has thus infected the kidney, although the portal of entry into the blood cannot always be recognized.

In some instances of great interest the pyelonephritis is unilateral, and this, in the opinion of many, adds further support to the view that the renal infection is primary. In the much larger group of cases where the renal lesion is secondary, although still hematogenous in origin, the primary focus of infection may be an acute infective process, and among those quoted by Eisendrath are pneumonia, enteric fever, erysipelas, diphtheria, or a focus of suppuration in some other part of the body, or,

lastly, what is perhaps the most important group of all, some variety of enteritis.

Enteritis is regarded as a frequent cause of the pyelonephritis of children, although here again the etiology is rather complicated, inasmuch as the disease is one far more common in females than in males, and it may well be that the renal infection is really often of the ascending type and due to direct contamination of the vulva, the short urethra of the female greatly increasing the risk of infection of the urinary tract. The *Bacillus coli* and the more common pus-producing organisms are the organisms most frequently present in cases of pyelonephritis, whether this is of hematogenous or of urogenous origin. Eisendrath is of the opinion that the morbid anatomy of these two varieties presents considerable differences. In the ascending type, acute or chronic pyelitis is frequently present, and, further, the renal lesions are characterized by the presence of yellowish streaks in the papillæ extending through the medulla to the cortex. There are often numerous miliary abscesses in the cortex, often arranged in groups and surrounded by a zone of intense hyperemia. In the hematogenous variety there are no preceding changes in the renal pelvis, and the yellowish streaks of purulent softening extending from the papillæ to the cortex are absent. In the most acute type or case, which is often rapidly fatal, the kidney only presents the signs of a very acute congestion with turbidity of the renal parenchyma. In less acute cases numerous miliary abscesses are present, but, according to Eisendrath, they do not present the same tendency to grouping that is so characteristic of the urogenous type. In some instances a single or several large abscesses are found in the kidney instead of many miliary foci of suppuration.

This author is also of the opinion that the two types, the hematogenous and the urogenous, can be differentiated clinically, and this is more especially true of the more acute hematogenous forms. In the most acute variety the onset is extremely sudden, and often the patient has previously enjoyed good health, there is great prostration and much pyrexia, the fever occasionally reaching as high a level as 106° F., the pulse is very rapid and there is much vomiting. In some cases severe abdominal pain, muscular rigidity, and marked tenderness over the costovertebral angle are present, together with considerable leukocytosis. These abdominal signs are of great importance, although their presence may lead to confusion with other abdominal diseases, such as appendicitis, cholecystitis, and perforation and peritonitis from gastric or duodenal ulcers. In most cases the changes in the urine will afford a means of distinguishing these different conditions, but in some cases the urine shows but little change in the early stages, and then great difficulty may be experienced in the diagnosis, more especially owing to the fact that sometimes the renal lesion is unilateral and the right kidney is more often affected than the left. In the less acute variety

of the hematogenous type there is more resemblance to the urogenous type, but there is usually in the former the history or the presence of a focus of suppuration in some other part of the body, or else the history of a recent acute infectious illness, whereas in the urogenous type there will be a history of cystitis or of obstruction of the urinary tract in the majority of cases. There is, further, some tenderness over the iliocostal angle, and there is also often some muscular rigidity in this region.

In the urogenous variety the fever may be of the recurrent, febrile type, or else in the more chronic forms the pyrexia is more or less constant but does not reach a level higher than 99° or 100° F. Such patients often become exceedingly anemic and have a peculiar lustreless, yellowish color. In the recurrent febrile type, rigors with marked pyrexia occur at very irregular intervals but usually in groups, so that the rigors recur once or more daily for several days, then an apyrexial quiescent period of varying length follows, and then the rigors recur again. The daily output of pus in the urine is also apt to vary, being usually larger in amount in the non-febrile periods, so that it is probable that the pyrexial attacks are due to absorption from the pent-up pus.

Eisendrath draws special attention to the pyelonephritis of childhood, and also to that of pregnancy. Both of these varieties are apt to be overlooked unless the urine be carefully examined in all cases of sudden illness associated with pyrexia. In childhood pyelonephritis may be confounded with some variety of enteritis and even with pneumonia, owing to the high fever, abdominal pain, etc. In pregnancy and the puerperium the malady may be confounded with other septic infections. In not a few cases during pregnancy the urinary symptoms may be slight, although tenderness over one or both kidneys may be present, and this is a valuable diagnostic indication. In many cases where this affection complicates pregnancy or the puerperium, the pyelonephritis is due to the *Bacillus coli*, and it is probable that the source of the infection is the alimentary canal, although authorities differ as to whether it is invariably due to a blood infection or not.

Wright¹ also deals with this question of infection of the kidney with the *Bacillus coli*, and, in recording two cases, draws attention to the urinary changes, pointing out that the urine is usually acid, turbid, with an excess of mucus, albumin is present only in traces in the early stages, and hematuria is rare. Microscopic examination shows the presence of pus cells in greater or less abundance, together with numerous *Bacillus coli* lying between the pus cells rather than in them, as phagocytosis apparently does not take place in the urine. Casts may or may not be present, and it would seem that their presence is largely determined by the severity of the renal affection. Cultivation of the urine is a better means of determining the presence of the *Bacillus coli*, as the examina-

¹ The Practitioner, March, 1909, No. 489

tion of the urine may fail to reveal it even when present in considerable numbers.

Wright also draws attention to the greater frequency of the malady in women than in men, and also to the greater frequency with which the right kidney is involved. He is inclined to attach considerable importance to the greater mobility of the right kidney as a factor in the etiology of the disease, and, as he points out, this question of mobility may be the cause answerable for the more frequent prevalence of the malady in women than in men. Wright is of opinion that the infection is frequently, if not usually, an ascending one, and he considers the fact that the renal lesion is so often unilateral is more in favor of an ascending than of a descending infection. Further, the removal of the affected kidney, if the disease is unilateral, is followed by subsidence of the symptoms of septic poisoning, and lastly, it is often impossible to find any other focus of infection that can be looked upon as the primary seat of the disease.

It is possible that the actual determining factor in bringing about the renal infection is some increase in the virulence of the organism, as several observers, and among others Dudgeon, have shown that the *Bacillus coli* may be present in the urine without its presence giving rise to any symptoms. Wright is of opinion that the renal infection is one where there is a distinct tendency to spontaneous cure and that many cases recover without surgical interference, while others get well after a simple nephrotomy. The administration of urinary antiseptics has not proved of much service in the treatment of this affection, but Dudgeon has used with considerable success anticolon bacillus serum in doses of 25 c.c. daily for three days, and in 5 cases out of 12 treated in this way the relief was rapid. Vaccine treatment of these cases has yielded uncertain results, and relapses are said to have occurred frequently. Wright is in favor of treating the more refractory and serious cases by nephrotomy and drainage, and he would resort to nephrectomy only in those cases where the less serious operation of nephrotomy has failed.

Persistent Hematuria of a severe type, and occasionally so intense as to cause serious anemia, is seen from time to time when the more usual causes of hematuria, such as calculus, neoplasm, or tubercle, can be excluded, and there is often much difficulty in determining the nature of these cases. Hugh Cabot¹ records a case of this type where the lesion found was a varicose condition of the vessels situated at the apex of one or two of the papillæ of the kidney. The hemorrhage in this case had been so severe that nephrectomy was performed after ascertaining by cystoscopic examination that the blood was derived from the left kidney, and the operation was followed by the cessation of the hematuria. On

¹ American Journal of the Medical Sciences, No. 442.

microscopic examination the venules at the tip of one of the renal papillæ were found to be much dilated with distinct varicose swellings, and these dilated veins were only covered by a very thin film of connective tissue and a single layer of epithelial cells.

Cabot quotes a series of cases, 6 in number, reported by Henry Fenwick, where operation was undertaken for profuse and persistent hematuria, and where in some instances the vessels at the apex of the papillæ were found distinctly varicose, and in one instance a distinct capillary nevus or angioma was present. In some of the instances of marked hematuria of this type the symptoms may closely resemble those due to calculus, since the clots formed in the renal pelvis or ureter may give rise to attacks of pain very similar to those occurring in renal colic due to calculus.

Kretschaner¹ also deals with the subject of so-called *Essential Renal Hematuria*, but from a different pathological standpoint, and especially from the point of view of the occurrence of this severe hemorrhage in certain cases of nephritis where the other clinical manifestations of nephritis are either ill marked or absent. Hematuria in greater or less degree is, of course, a well-known occurrence in many forms of acute and of chronic nephritis, but there are certain cases where the patient presents practically no other signs or symptoms of renal disease except the profuse hematuria. The most obscure cases are those where this hematuria occurs in cases of chronic nephritis that have run a latent course until the occurrence of the hematuria. The hemorrhage is usually considerable in amount, the blood being intimately mixed with the urine, and the quantity of blood is often so large that it is not possible to determine whether albumin is present in the urine apart from that derived from the admixture with blood. The hemorrhage may be intermittent or continuous, and I have known of a case where it persisted from the time of its first occurrence until death four months later. Sometimes a diagnosis may be arrived at with the progress of the case, owing to the presence of cardiovascular changes, or to arterial changes in the fundus oculi, or to the development of uremia, but in the earlier period of its development diagnosis is very difficult, and confusion with malignant disease of the kidney, or even with hemorrhage due to lesions in the lower urinary tract, is apt to arise.

Kretschaner has succeeded in collecting some 129 cases of so-called essential renal hematuria, and of these, in 61 cases the kidneys examined microscopically, and in 52, definite changes characteristic of nephritis were found, although in some instances they were but slight in amount. There is no reason to think that hemorrhage of this type can arise from a perfectly normal kidney, and where the lesions are slight, it is probable that the source of the bleeding is to be sought in

¹ Zeitschrift f. Urologie, Band i, Heft 6.

the hyaline degeneration of the walls of the capillaries, as this has been so often observed to be present. Kretschner reports one case of great interest where examination showed that the hemorrhage was derived from the left kidney and where decapsulation was performed with a view to arresting the bleeding. The microscopic examination of a fragment of kidney removed showed only a marked increase in the number of nuclei in the glomeruli. Eighteen months later the hemorrhage recurred, and was so severe that nephrectomy was necessary to arrest it, and the kidney removed then showed distinct signs of subacute nephritis. These cases of profuse renal hemorrhage associated with chronic latent lesions of the kidney must be distinguished from the cases of hemorrhagic nephritis often of an acute type, where the urine is loaded with blood but where there are other signs of nephritis, *e. g.*, uremic manifestations and anasarca; there is not usually much difficulty in recognizing the true nature of these cases.

The X-rays and Renal Calculi. Auld¹ summarizes our present knowledge as to the value of *x*-ray examination in the diagnosis of renal calculus. It would seem, from the statistics there recorded, that prior to the introduction of the *x*-ray method of examination the operation of nephrotomy for calculus was frequently undertaken without a stone being found; in fact, in the hands even of experienced operators the percentage of error was nearly 50. There are not only many other conditions, especially biliary colic and appendicitis, that may give rise to pain resembling that of renal colic, but further, there are several renal diseases in which attacks of pain closely simulating those of calculus may occur. Thus not only tubercle of the kidney, but also neoplasms, pyelitis, bilharzia, and, more important perhaps than these, anomalies of the ureter leading to temporary kinking of the ureter, may all give rise to attacks of pain simulating those seen in calculous disease. Other errors have also been made; thus, the wrong kidney has been cut down upon, owing either to the pain being referred to the opposite side, or in other cases to bilateral calculous disease with the kidney on one side completely atrophied and functionless as the result of the secondary changes brought about by the calculi. Further, the kidney has been explored when the calculus was impacted in the ureter, and vice versa. Again, when a stone has been successfully found, the presence of a second one has been overlooked, and its non-removal has led to the development of symptoms later. All these difficulties and uncertainties have tended to the postponement of operative interference in many cases of calculous disease until a late period, and then frequently secondary septic complications have developed which very materially increase the gravity of the operation and make the prognosis much more unfavorable.

In the earlier days of the use of the *x*-ray apparatus many failures

¹ Montreal Medical Journal, June, 1909, vol. xxxviii, No. 6.

were recorded, and thus the opinion gained ground that the method was only applicable to cases of oxalate of lime calculi, and that other calculi, and especially those consisting of uric acid, could not be detected with certainty. Great improvements in the apparatus and in the technique during the last few years have, however, led to the obtaining of far better results. Auld quotes Leonard as saying that "A skiagram to be accurate must differentiate tissues of less density than the least dense calculus." Thus, if a skiagram can differentiate the kidney from the surrounding structures, then a calculus in the kidney should be readily visible on the plate. Leonard reports a series of 320 cases. In 93 of these a calculus was diagnosticated on x -ray examination. In 42 cases the stone was found by operation, and in 26 cases the stone was passed spontaneously. In the remaining 25 cases an operation was not performed, because in 2 cases it was refused and in the remaining 23 the symptoms were so slight that operation was not necessary. In 4 cases among the 2274, where the x -ray examination was negative, the symptoms persisted, operations were performed, and stones found. This extensive series of cases shows that in the hands of a skilful expert the margin of error is a very small one and that the x -ray method affords a means of diagnosis infinitely more accurate in its results than any previously available.

In a series of cases reported by Holland in the *Lancet* for 1906, and 79 in number, there was only one error, and in this case the x -rays failed to reveal a uric acid stone that was subsequently passed spontaneously. Auld considers that all errors are referable to the operator, the photographic plate, or to some peculiar condition of the patient. Skill in technique is of the utmost importance. Thus, the plate may not be accurately placed, or the exposure may not be the one suitable for the differentiation of tissues required in order to show up a calculus clearly; sometimes a flaw in a plate has led to an error. One of the greatest difficulties, however, is that of obesity in the patient, and some authorities say that it is not possible to give a certain opinion in a very fat patient. In some instances the composition of the stone has led to difficulties, as a small and pure uric acid stone may be revealed only with great difficulty. Lastly, the presence of calcified lymphatic glands has led to serious error, but here assistance may be obtained from the absence of urinary symptoms.

Auld summarizes the value of x -ray examination, at the present time, by stating that in the hands of an expert: (1) It adds a certainty to the diagnosis of renal calculus hitherto unobtainable, and thus differentiates not only calculous disease from other affections of the kidney, but also from diseases of other abdominal viscera, giving rise to pain. (2) It often enables an early diagnosis to be made in cases where the symptoms are slight, and this allows of an operation being performed at a period when the outlook is far more favorable owing to the absence of any

septic complications and also of any extensive destruction of the kidney. It has been stated that the mortality of the operation at an early period of the disease before septic complications have occurred, is as low as 2 to 3 per cent., whereas later, when these have developed, the mortality may be as high as 25 per cent. (3) Lastly, as Auld states, the *x*-ray examination makes the operation not only definite, but also complete; thus, it may not only show that the calculus is in the ureter, but also, for instance, that more than one stone is present. Used with other methods of diagnosis it is invaluable and is the nearest approach to accuracy.

Calculous Anuria. Watson¹ discusses certain problems arising in cases of calculous anuria, and more especially the advisability of bilateral nephrotomy in certain varieties of this condition. Many authorities regard the occurrence of anuria in cases of calculous disease as proving that only one kidney is functional, and that the opposite organ is either absent as a result of some congenital anomaly, or else that it has undergone complete destruction as a result of disease that may not have produced symptoms sufficiently urgent to attract notice. In other words, they agree with the aphorism of Leguen that "anuria does not occur except in patients who live with one kidney only." This is undoubtedly true of the great majority of cases of calculous anuria, but, as Watson points out, not of all, and he is strongly of opinion that a "renorenal reflex inhibition of the function of an unobstructed kidney produced by the sudden obstruction of the ureter of the kidney of the opposite side" may occur. It is only in very rare instances that such a reflex inhibition occurs where the unobstructed kidney is normal, but such cases undoubtedly do occur from time to time.

Watson, however, draws especial attention to such a reflex occurring in cases where there is bilateral disease, but, nevertheless, where each kidney is capable of some work. He narrates cases of anuria where a unilateral nephrotomy was performed and the kidney found to be diseased, and yet when subsequently anuria again occurred and a second nephrotomy showed that the kidney of the opposite side was also diseased, but still capable of some functional activity which was regained as a result of the second nephrotomy. In one case, where the two organs were permanently drained through the loins, the patient remained in a good condition three years after the second operation. The consideration of such cases has led Watson to advise bilateral nephrotomy in certain cases of calculous anuria, since if there are cases in which both kidneys possess some degree of functional activity, and if the functional activity of one of them alone is insufficient to maintain life, the chances of the patient's recovery will be materially increased if the operation of nephrotomy is performed on both sides instead of on one side only, as is usually

¹ American Journal of the Medical Sciences, April, 1909, No. 445.

the case. Watson considers that the bilateral operation should be performed in all cases when "upon cutting down upon the first kidney it is found that there is not enough renal substance remaining to make it probable that the organ will be capable of sustaining life by the exercise of its function alone."

The greater the destruction of the kidney first operated on, the greater the importance of the activity of the remaining kidney and the greater the probability that this second kidney contains a useful amount of kidney substance. Watson considered that bilateral nephrotomy should also be performed in all cases of simultaneous blocking of both ureters and also in the cases where, although only one ureter is blocked, there is a calculus in the opposite kidney, since in such a case the ureter of this second kidney may at any moment become obstructed.

SURGERY OF THE EXTREMITIES, SHOCK, ANESTHESIA. INFECTIONS, FRACTURES AND DISLOCATIONS, TUMORS.

BY JOSEPH C. BLOODGOOD, M.D.

SHOCK.

Hemolysis. In view of the fact that direct transfusion of blood by an arteriovenous anastomosis is the most important method of treatment in extreme cases of shock with and without loss of blood, it is quite important to know whether there is any danger from such blood transfusion. I discussed this in *PROGRESSIVE MEDICINE*, December, 1908, and quoted Simon, of Baltimore (page 119), who now makes the following correction. I am sorry that Simon was misquoted, but I got the statement directly from one of his assistants. The correction is as follows:

“In *PROGRESSIVE MEDICINE*, December, 1908, Dr. Bloodgood, referring to the question of the possibility of hemolysis in blood transfusion, remarks that I recommend the examination of the recipient's serum against the donor's corpuscles, while, according to Crile, hemolysis between the donor's corpuscles and the patient's serum will do little harm, whereas reverse hemolysis strictly contra-indicates transfusion, and that two tests should accordingly be made, of which the most important one is just the reverse of the one ascribed to me. This statement, so far as my attitude is concerned, rests on a misunderstanding on the part of Bloodgood. If the blood test is made at all, then it should be made on both sides, viz., both the donor's and the recipient's serum should be tested against the recipient's and donor's corpuscles respectively. The concentrated serum, moreover, should be used, and not the diluted serum, as is erroneously stated in Bloodgood's article.”

Crile, in his recent book on *Hemorrhage and Transfusion*,¹ discusses hemolysis on p. 313, and the technique of making hemolytic tests on p. 320. Since this was written I have discussed this question personally with Crile and with Moss, who has done a large amount of very careful work in the Johns Hopkins Hospital, and have read the contributions of Weil, with the conclusion that for practical purposes the dangers of

¹ D. Appleton & Co., 1909.

direct transfusion are too small to consider them, if the indications for the transfusion are urgent.

DIRECT TRANSFUSION OF BLOOD. The best contribution to this subject is the book by George W. Crile on *Hemorrhage and Transfusion, an Experimental and Clinical Research*. Most of the work in this book had been published before in separate monographs, and has been discussed in *PROGRESSIVE MEDICINE*, but Crile, in the volume just referred to, of almost six hundred pages, summarizes all that is good on this important subject. In the index of volume li of the *Journal of the American Medical Association*, which represents the literature from July to December, 1908, there is but one reference to a new method of transfusion, while in the next volume (lii) there are ten references. Crile's splendid work is bearing fruit. Surgeons are familiarizing themselves with the technique and are employing it with success in suitable cases. As I stated before, very emphatically, every surgeon should familiarize himself with the technique of arteriovenous anastomosis for transfusion. H. P. Cole¹ illustrates beautifully Crile's method, and reports a case of transfusion in *pellagra*, with recovery.

The Nature of Shock. Although the last year there have been a number of excellent contributions to the etiology and treatment of shock, nothing really has been added, and many of the problems in the physiology of this condition are still unsettled. Allport² presented the subject before the Annual Meeting of Railroad Surgeons from the clinical side, and was interested especially in the question whether it is advisable to operate during shock in cases of traumatic injury. He quotes a very good rule of Guthrie: "Wait four to six hours, until the pulse comes up and the patient commences again to feel pain; otherwise don't operate." Seelig and Lyon,³ of St. Louis, present the subject from the experimental standpoint with some of their own experiments, with the conclusion that shock is not entirely due to an exhaustion of the vasomotor centre. They agree, therefore, with Porter, and not with Crile. This article is of value, because it gives references to the best literature on this subject up to date, practically all of which I have reviewed in previous numbers of *PROGRESSIVE MEDICINE*. Henderson⁴ discusses the subject from a purely physiological standpoint. He is of the opinion that in an abdominal operation the exhalation of carbon dioxide from the exposed viscera is another factor in shock. Henderson will make further contributions. Dolly,⁵ of Chapel Hill, North Carolina, in a paper before the American Association of Pathologists and Bacteriologists, discusses his interesting experiment on the morphological changes

¹ Southern Medical Journal, April, 1909, vol. ii, p. 631.

² Surgery, Gynecology, and Obstetrics, April, 1909, vol. viii, p. 388.

³ Journal of the American Medical Association, January 2, 1909, vol. lii, p. 45.

⁴ American Journal of Physiology, February, 1909, and April, 1909.

⁵ Journal of the American Medical Association, May 1, 1909, vol. lii, p. 1454.

in the nerve cell in relation to anemia and surgical shock. This point has been discussed here before. It has been found that in dogs which have been resuscitated, if the interval of time during which the brain was practically anemic extends beyond a certain point, the animal is unusually stupid and remains so. Dolly now finds a definite morphological change in the nerve cell which explains this. The subject was also considered by Crile and Dolly,¹ and there are other interesting contributions to the same subject by Guthrie and Stewart,² and Zeller.³

The point I wish to emphasize is that, in spite of the fact that nothing especially new has been added to the subject, either clinically or experimentally, yet the profession as a whole is familiarizing itself with the work already done, is getting a better conception of this pathological condition called shock, and understands better its prevention and its treatment. Shock in all its forms is taking a much more important place in the minds of both physicians and surgeons, and physiologists, recognizing the practical importance of the solution of many of the yet unsettled problems, are again devoting more attention to this unusually interesting and as yet somewhat elusive problem in physiology.

In my own experience during the last year I find myself gaining greater confidence in my ability to prevent shock, and when it does occur, the knowledge that direct transfusion of blood is a procedure not difficult to perform gives confidence, so that death should seldom take place from either hemorrhage or shock. This year I have performed a direct transfusion from mother to son; and it saved the life of the son from pure shock in which there was no loss of blood.

EMOTIONAL SHOCKS. A. Kuzinski⁴ discusses this. There is no doubt that there is a psychical element to shock, the result of fear, or some analogous emotion, and this element can be eliminated by proper psychotherapy. Surgeons probably see this more in their cases of exophthalmic goitre. Within a few months I saw a patient with exophthalmic goitre more shocked by fear than she was two weeks later by the anesthesia and operative intervention. We are, at the present time, in the age in which the psychical symptoms of every disease have taken an unusually prominent position. Whether this aspect has been overdrawn or not, there is no doubt that it must always be considered by practical physicians and surgeons.

THE TREATMENT OF SHOCK. Mummery and Symes,⁵ in their experimental work, confirm Crile's conclusions. They find that in deep narcosis the handling of the intestines with blunt instruments produces more shock than cutting with a sharp instrument. This shock is greater

¹ *Journal of Experimental Medicine*, November, 1908, vol. x, p. 782.

² *Ibid.*, July 1908, vol. x, p. 490.

³ *Deutsche Zeitschrift f. Chirurgie*, 1908, vol. xcv, p. 488.

⁴ *Medizinische Klinik*, March 7, 1909, vol. v, p. 10.

⁵ *British Medical Journal*, September 9, 1908.

when the blunt handling is confined to the parietal peritoneum, ligaments, or mesentery. Under ether the shock is less than under chloroform.

It is such experiments that give the practical surgeon the key to the prevention of shock during operation. It is no longer necessary to confirm these truths at operation. In the treatment of shock these investigators come to the already well-known conclusion that for a severe degree of shock an intravenous salt infusion is better than a subcutaneous, and when the arterial pressure is unusually low, adrenalin or the extract of pituitary gland gives better results than salt alone, and that the extract of the pituitary gland apparently gives a better and more permanent effect than adrenalin. This is the first time that I have referred to the pituitary gland in the treatment of shock or any other condition.

Pituitary Gland. The desiccated substance from this gland of the anterior and posterior lobes has been placed upon the market in a powder form.¹ The dose is from one to four grains. I have not the original reference to Mummery and Symes, so I cannot give the dose used for intravenous infusion.

THE BLOOD.

Examinations of the Blood for practical purposes in surgery are becoming more and more important. In *PROGRESSIVE MEDICINE*, December, 1901, p. 205, I introduced the subject chiefly in relation to the leukocyte count as a diagnostic aid, the examination for grave anemia, and the examination of blood for the common and well-known blood diseases, for example, leukemia and pernicious anemia. In view of the importance of a blood examination, it is surprising how slow the general profession has been to acquire the knowledge of the newer methods. In addition to the above, we have mentioned from time to time the hemolytic tests for malignant disease—a thing by no means established—the examination of the blood (when there is time) before resorting to direct transfusion, and the examination of the coagulation time. The most recent innovations are the experiments on the effect of *hirudin* to retard the coagulation time, with the hope that this drug may prevent postoperative thrombosis and embolism.

THE COAGULATION OF BLOOD. Since the very interesting experiments of Hinman and Sladen,² there is a very extensive article by Denk and Hellmann.³ They prefer Wright's method and apparatus for the determination of the coagulation time and look upon this determination

¹ *Journal of the American Medical Association*, June 12, 1909, vol. lii, p. 1929.

² *Johns Hopkins Hospital Bulletin*, June-July, 1907, vol. xviii, p. 207.

³ *Mittheilungen a. d. Grenzgeb. d. Med. u. Chir.*, 1909, vol. xx, p. 218.

as a very important one in surgical cases. When the coagulation is found to be retarded they recommend the prophylactic treatment before operation with calcium salts and serum injections. Any serum will do; the ordinary serum for tetanus is most available and less apt to upset the patient than the antidiphtheria serum. In cases in which the coagulation time is increased, the patient, after operation, should be given *no milk*, because it contains the salts which increase coagulation, or any drugs which increase the coagulation of blood. This treatment is based on the hope that thrombosis will not take place. In addition they recommend the use of citric acid.

In an editorial in the *Journal of the American Medical Association*, March 6, 1909, vol. lii, p. 778, Wright's researches in 1893 are compared with the more recent investigations of the question by Addis.¹ Wright claimed that moderate doses of calcium chloride would increase the coagulation and citric acid decrease it; Addis used more accurate methods for the determination of coagulation, with the conclusion that in ordinary doses neither calcium salts nor citric acid has any effect. In spite of this work of Addis, I still feel that we should use calcium salts and serum injections, as recommended in the most recent communication of Denk and Hellmann.

Rimann and Wolf² have published their interesting experiments on animals which demonstrate that hirudin diminishes the time of the coagulation of blood. *Hirudin* is the extract of the mouth glands of the leech, and this property was discovered in 1884 by Haycraft. This drug may prove of value in preventing postoperative thrombosis. It is interesting that the studies were made in Trendelenburg's clinic, who devised the operative method which has been successfully employed to remove a thrombus from the pulmonary artery.

Dr. Boggs, the resident physician of the Johns Hopkins Hospital, informs me that in his animal experiments with hirudin the changes in the kidney were of such a character that he would not feel justified in employing this drug on human beings.

Hemophilia. Any investigation on this interesting disease is naturally one chiefly concerned with the coagulability of the blood and methods to control hemorrhage from this cause. Dahlgren,³ in reporting some cases of his own, goes over the entire subject and brings the literature up to date, but really adds nothing new. There is still difference of opinion as to the exact cause of hemorrhage in hemophilia. Sahli's⁴ work in 1904 remains the best clinical and experimental investigation. He has shown that the coagulability of the blood at the time of hemorrhage in hemophiliacs is increased, that the fault is in the vessel

¹ Quarterly Journal of Medicine, January, 1909.

² Deutsche Zeitschrift f. Chirurgie, 1909, vol. xcii, p. 177.

³ Beiträge zur klinische Chirurgie, 1909, vol. lxi, p. 645.

⁴ Zeitschrift f. klinische Medicin, 1904, vol. lvi, Nos. 3 and 4.

lining, and not so much in the blood. Baum,¹ in his clinical and experimental investigation, considers chiefly the treatment with serum. He concludes that the serum must be fresh; it is of no particular value as a prophylactic, but does seem to have an effect during hemorrhage. These two recent investigators, similar to others, have discovered good results with different drugs, but no uniform good results with any single drug, so that it is fair to infer that in many of the apparent cures the factor has been in a spontaneous cure of the disease itself, and the result cannot be attributed to any therapeutic agent.

Crile, in his book on *Hemorrhage and Transfusion*, p. 124, devotes part of a chapter to hemophilia. In regard to the blood, he refers entirely to the work of Sahli. As regards treatment, there is the usual rule for prophylaxis against the marriage of hemophilic patients, the avoidance of wounds in individuals with this tendency, and the general hygienic care. As regards the specific treatment, he discusses practically all of the remedies which have been advocated—calcium salts, fresh serum, antidiphtheria and antitetanus serum, thyroid extract, gelatin, etc. The point, however, for which one turns to Crile's book, is in regard to transfusion. He reports a successful case (p. 499) in which the hemorrhage was secondary to a plastic operation for squint; when seen, the patient had been bleeding for six days and was in a critical condition. In a second case, also with recovery (p. 534), the hemorrhage was nasal. Then there are two recent cases recorded in a foot-note; both recovered. I cannot see that it has been proved that transfusion is the thing to do in hemophilia, except in late cases when one transfuses to tide the patient over a few days longer with the hope that hemorrhage will cease spontaneously, and this seems to me the tendency in the great majority of the cases.

ANESTHESIA.

Intravenous General Narcosis. This is one of the newer methods of the year. It has been used only on animals, but Nerking and Schuermann² have demonstrated that urethan or, better, ethylurethan combined with chloral hydrate produces anesthesia on animals for fifty minutes. I will discuss later the intravenous and intra-arterial methods under local anesthesia.

One welcomes experimental work along this line, because undoubtedly a subcutaneous or intravenous method with the simple technique of a hypodermic injection would be looked upon as a great step in advance in the problems of anesthesia.

Scopolamin-Morphine. I have discussed this before. Up to the present time I have not employed it in my own cases. Judging from

¹ Mittheilungen a. d. Grenzgeb d. Med. u. Chir., 1909, vol. xx, p. 1.

² Medizin Klinik, 1908, No. 46; Centralblatt f. Chirurgie, 1909, vol. xxxvi, p. 184.

recent literature, one might conclude that it is not being generally accepted.

Boesch¹ describes the advantages with an experience of fifty cases in minor operations in which this anesthesia was employed alone. In fifty cases it was combined with general anesthesia for vaginal examination, and in one hundred cases for examinations and operations. He looks upon it as a good method, but he has not excluded postoperative pneumoniae—in his series of cases, 0.7 per cent. This in my experience is about the same as follows ether narcosis for hernia. The experience, therefore, of this clinic in Basel does not prove that it has any advantages over general narcosis.

Klein² uses scopolamin-morphine with spinal anesthesia. He speaks of the combination of "twilight sleep" and spinal anesthesia. He calls attention that after operation the patients are sitting up in bed, in great contrast to those after chloroform anesthesia. To an American surgeon familiar with good ether-drop narcosis, this observation creates no impression in favor of scopolamin-spinal anesthesia, because after proper ether narcosis patients are thoroughly out of the anesthetic before they leave the operating room, and can be propped up in bed if it is desired.

Sick,³ who has recorded a death in a patient with arterial sclerosis and senile gangrene, still favors the method, but he warns against a larger dose of morphine than 0.0015 gram. This is about one-fourth of a grain of morphine. He uses the hypodermic scopolamin-morphine about one-half hour before the ether or chloroform.

Zadro⁴ records the experience in von Eiselsberg's clinic in Vienna, with 770 cases. In some it was combined with Schleich's infiltration. This method is especially good for goitre operations. Sometimes, in addition, general anesthesia is given. There is nothing in this contribution that impresses me as of any great advantage over properly administered ether-drop narcosis.

Schoemaker⁵ gives the most extended report of the year—an experience with 3000 cases and 3 deaths.

His method is as follows: At midnight, 1 gram (15 grains) of veronal; at half-past six in the morning, scopolamin, 0.00025 grams ($\frac{1}{2000}$ grain), and 0.0075 gram ($\frac{1}{8}$ grain) of morphine; at half-past seven this is repeated; at eight the patient gets general narcosis. Three deaths in 3000 cases would be looked upon as too many for ether alone. The dose of morphine here is larger than advised by Sick.

At the present time I am not convinced that it is any better than

¹ Centralblatt f. Gynäkologie, December 12, 1909, No. 50.

² Münchener medicinische Wochenschrift, November 24, 1909.

³ Deutsche Zeitschrift f. Chirurgie, 1908, vol. xvi, p. 1.

⁴ Wiener klinische Wochenschrift, April 1, 1909, vol. xxii, No. 13.

⁵ Deutsche Medicinische Wochenschrift, 1909, No. 7.

morphine and atropine in safe doses about one-half hour before the ether-drop method.

General Narcosis. Apparently the trend of opinion, as gathered from the literature and from my own personal observation, is in the direction of specialization in anesthesia. Every hospital should have some physician on its staff who can be looked upon as an expert anesthetist. I favor this policy, but nevertheless the young graduates in medicine connected with the different surgical staffs throughout the country must and should have experience in giving anesthesia. No surgeon should be without such an experience. In my own personal observation I find that in the majority of cases I can direct the ether-drop method given on an open cone. For some cases one must have an expert, for many this is not necessary, and these patients should be anesthetized by one of the junior staff under the direct supervision of the chief surgeon and his first assistant.

There is an excellent handbook on the *Science of Anesthesia*, by Müller.¹ The *Journal of the American Medical Association*, November 7, 1908, vol. li, pp. 1572 to 1582, brings a number of articles on anesthesia. The report of the Commission of the American Medical Association submits three recommendations: First, that for the general practitioner and for all anesthetists, not especially skilled, ether must be the anesthetic of choice; ether administered by the open or the drop method; secondly, that the use of chloroform, particularly for operations of minor surgery be discouraged, unless it be given by an expert; thirdly, that the training of skilled anesthetists be encouraged and that undergraduate students be more generally instructed in the use of anesthetics.

They add: "We believe that the further use of nitrous oxide combined with air and oxygen in major surgical operations is promising." The report is signed by J. G. Mumford, of Boston, J. F. Binnie, of Kansas City, C. A. Powers, of Denver, W. D. Haggard, of Nashville, and W. L. Rodman, of Philadelphia.

In the same number, Cunningham and Anderson discuss the methods of administering ether, with the following conclusions: "The drop method is a very popular one; it is practically safe." Haggard, of Nashville, discusses nitrous oxide anesthesia and chloroform anesthesia.

In the *New York Medical Record*, August 15, 1908, there are a number of communications by Bristow, Meyer, Abbe, Lilienthal, Gibney, and Pendleton on general anesthesia, especially in relation to the expert.

It is my opinion that we need better publications on anesthesia. The general principles are established, and the report of the commission just noted and the majority of recent contributions absolutely confirm the position I have taken in *PROGRESSIVE MEDICINE*. Safe anesthesia with comfortable convalescence without complication has

¹ Trenkel, Berlin, 1908.

been established for the vast majority of patients who have to be operated upon. In this group there is not much difference between one with a little training and an expert, but there is a smaller group of cases in which the decision as to the choice of the anesthetic, the technique of its administration, the meeting of complications, and many other details is by no means easy, and the problems are not as yet definitely settled. Along these lines we want experimental laboratory work and more careful clinical observation.

Acidosis Complicating Anesthesia. This is not a frequent complication of anesthesia, but should always be looked for. Wallis and Gillespie¹ are of the opinion that glucose is more efficacious in controlling acetoneuria than sodium bicarbonate. Secondary postanesthetic vomiting is in close relation with the amount of acetone produced. If vomiting persists over twelve hours, the stomach should be washed out with a solution of sodium bicarbonate. The danger of acidosis is less if the anesthetic is given by an open method. I cannot agree with the necessity of washing out the stomach if there is some vomiting after twelve hours. Such a rule would involve unnecessary labor on the part of the residents, and discomfort on the part of the patient. Acidosis can be easily diagnosticated from the odor of the breath and the examination of the urine. I rarely observe it. With good anesthesia combined with the routine salt solution per rectum, it must be less frequent. When it is present, especially in diabetic cases, the stomach should be washed out with sodium bicarbonate, which should also be given with glucose per rectum, by mouth, and subcutaneously.

The best contribution in English on acidosis and associated conditions is by James Ewing,² of New York. Ewing concludes with the following summary:

1. While all classes of foodstuffs yield acetone compounds in the test tube, yet in the body these compounds are derived mainly from the fat tissues and to a less extent from the food. In diabetes, however, the proteins contribute directly or indirectly to the formation of acetone compounds. To what extent the proteins are drawn on in other conditions remains uncertain.

2. The complete combustion of fats requires the simultaneous katabolism of carbohydrates, in the absence of which there is a defective and possibly abnormal course of fat combustion lodging in the acetone compounds. In all known conditions, even in diabetes, the metabolism of carbohydrates occupies a controlling position in this form of acidosis.

3. Oxidation in straight-chain fatty acids occurs at the beta-carbon atom, so that such acids with an even number and at least four carbon atoms may yield beta-oxybutyric acid. Oxidation of pure fatty acids

¹ *Lancet*, December 5, 1909.

² *Archives of Internal Medicine*, November and December, 1908, vol. ii, pp. 354 and 448.

in the test tube may occur at the alpha-carbon atom, with avoidance of acetone compounds, but whether this course may be followed in metabolism is uncertain. From branched fatty acids a methyl group may be replaced by hydroxyl, and in amino-acids oxidation occurs at any carbon atom holding an amino group, both of which processes may yield beta-oxybutyric acid. Knoop's work and the ready destruction of oxybutyric acid in healthy men indicate that this acid is a normal product of metabolism.

4. The urinary ammonia is influenced by the total nitrogen excretion, by the presence of fatty acid derivatives, by lactic acid, possibly by inorganic acids, and notably by defective synthetic function of the liver. It bears rather loose relation to the acetone compounds, and, being an indirect measure of the presence of acids, cannot replace their direct estimation.

5. The grounds are still inadequate to support the view that acetone compounds, as they arise in the body, exert any notable direct toxic action.

6. Oxidation and hydrolysis are both concerned in the formation of acetone compounds.

7. Lactic acid is a product of disordered or defective katabolism chiefly of glycogen; it results also from disturbed function of the liver, and bears an important relation to fatty degeneration.

I quote these conclusions, because I am of the opinion that the general practitioner is very apt, in his clinical work, to neglect the fundamental principles of medicine. Before one can understand and treat a disease he must have some conception of its anatomy, physiology, and chemistry, and at the present time the greatest development of practical importance to medicine is along the lines of physiological chemistry.

Status Lymphaticus. In all cases of sudden death during or directly after anesthesia every effort should be made for an autopsy to ascertain if this condition is present. Humphrey¹ reports five cases. He is of the opinion that it is not the fault of any special anesthetic, but the danger is equally great in all general anesthetics. This condition should always be looked for clinically, and, if present and an operation must be performed, Humphrey advises that no cutting be done or any painful manipulation until the patient is thoroughly in the third stage of the narcosis. Hillard² reports a fatal case, and McCardie³ discusses the relation of status lymphaticus to general anesthesia.

The Effect of Anesthetics upon the Kidneys. Today I am more anxious as to the effect of the narcosis upon kidney function than upon any other organ. At the present time postoperative pneumonia is undoubtedly on the decrease, while kidney complications are more common. Hirsch,⁴

¹ Lancet, December 26, 1909.

² British Medical Journal, January 25, 1908.

³ Ibid.

⁴ Zentralblatt f. d. Grenzgeb. d. Med. u. Chir., 1908, vol. xi, p. 769, etc.

in a very extensive review of the literature, comes to the following conclusions, and it is very interesting to note that these conclusions agree with practically all others, that is, from whatever standpoint anesthesia is studied, the same results are reached. These are: Ether is safer than chloroform; Hirsch demonstrates this for the kidney; the less the amount of the anesthetic, the less the injurious effect upon the kidney; this can be avoided or reduced by giving morphine and atropine, by cleaning the patient up before general narcosis, by keeping the patient under as lightly as possible, by making the operation as rapid as safety will allow, and by giving the anesthetic by the drop method on an open cone. Loss of blood increases the deleterious effect of the anesthetic upon the kidney. Surgeons can perform operations today practically without the loss of blood. Cooling off of the patient adds to the danger; this can be avoided. Repeated narcosis is dangerous. There should be at least an interval of one week, and if possible more. Oxygen administered with ether reduces the effect of ether on the kidney.

Up to the present time the investigations as to the effect of spinal anesthesia upon the kidney are not completed. It can be stated, however, that there is a deleterious effect, and it is not by any means settled whether this effect is any less than from general narcosis.

A careful collective review of this nature should receive publicity. In this country every surgeon is anxious to make anesthesia safe, and I am quite certain that the safety can be increased by very simple measures which are often neglected. Patients do not like to be prepared for operation, but there is no doubt that such a preparation is a factor which increases the safety. When patients have any symptoms of cardiac, pulmonary, hepatic, or renal disease, they should receive a more careful preparation. The essentials of every preparation are the same—rest, fresh air, a very restricted diet for forty-eight hours, and nothing but water and albumin for twenty-four hours; cleansing the bowels and plenty of water; in some cases urotropin.

In emergency operations we must take the risk, and, as a rule, we are dealing with pretty healthy subjects, but for operations which are not urgent no surgeon should today allow himself to be persuaded by the patient to undertake the operation without the proper preparation. In the first place, the dangers are less; in the second place, if any complication does take place, everyone will feel, that with our present knowledge, nothing has been omitted to avoid it.

In this preparation the patient can be protected from fear and anxiety. The chief objection to the longer preparation is that waiting increases anxiety, heightens, therefore, the psychical symptoms, and increases psychic shock. I cannot agree with this conclusion if the preparation is properly carried out and the patient given the reasons therefor.

Ether Narcosis. That the problems in regard to ether are pretty well settled is shown by the scanty references in the literature of the last

year. There are no further communications on ether pneumonia, because it is pretty well established that with good anesthesia postoperative pneumonia is usually embolic. I can find but one reference of interest and importance. Bloch¹ has studied the action of anesthetics, especially ether, on the hemoglobin and red blood corpuscles. He has found that there is always some, although sometimes very slight, injury to the blood cells. In the ordinary case this need not be borne in mind, but in grave anemia and long operations it becomes a factor that must be considered. Bloch is of the opinion that if the vapor of ether is warm, so that the differences of temperature in the lungs are less, the injury to blood cells will be decreased. I believe this is an important practical point. Davis, of Baltimore, has worked with warm ether with good results.

Chloroform Narcosis. This anesthetic finds few friends in recent literature. It has been a long, hard struggle to replace chloroform by ether. When I was a student, in 1890, Professor H. C. Wood remarked that any surgeon who had a death from chloroform anesthesia should be hanged for murder. He, of course, did not wish to be taken literally. Southerland,² in Australia, confirms the work of Bloch in his studies on the effect of chloroform on the blood in anemic women. He reports three deaths, and states that there is no question in his mind that the danger of chloroform in anemia is far greater than from ether.

There have been a number of interesting studies of the "chloroform necrosis" found after death from chloroform. H. Gideon Wells³ gives a most careful study of one observation with an interesting discussion of the literature. In his summary he comes to the following conclusions: The cases of delayed chloroform poisoning fall into two groups. In one children chiefly are affected; here the symptoms are those of acetonemia without jaundice; the changes in the liver are slight, and consist principally of fatty degeneration about the periphery of the liver lobule. In the second group the patients are usually young adults; the symptom complex is very similar to fatal acute yellow atrophy of the liver with its marked jaundice and hemorrhages. The liver here shows extreme degrees of necrosis. There are intermediate cases.

Weill, Vignard, and Mouriquand⁴ report an interesting group of cases belonging to the second group of Wells. Their cases were deaths on the second or third day after operations for appendicitis, with no other etiological factor except the chloroform.

Local Anesthesia. The most interesting contribution is that of Bier.⁵ This is well reviewed with the illustration in the *Journal of the American*

¹ Deutsche Zeitschrift f. Chirurgie, 1908, vol. xcvi, p. 131.

² Centralblatt f. Chirurgie, 1909, vol. xxxvi, p. 813.

³ Archives of Internal Medicine, July, 1908, vol. i, p. 589.

⁴ Centralblatt f. Chirurgie, 1909, vol. xxxvi, p. 572.

⁵ Berliner klinische Wochenschrift, March 15, 1909, vol. xli, No. 11; Archiv f. klinische Chirurgie, 1908, vol. lxxxvi, p. 1007.

Medical Association, May 1, 1909, vol. lii, p. 1466. Fig. 1 illustrates the method. The extremity is first made anemic with a Martin bandage, which is left in place some distance above the point to be operated on (Fig. 1, *a b*); then at a point some distance below, a second rubber bandage is placed; the veins are then injected. It is better first to let the blood out of the vein, wash with a little salt solution, and then inject from 50 to 100 c.c. of a 0.5 per cent. novocain solution. The anesthetic is at once diffused and the operation can be begun in a few minutes. There is no danger from toxic effects if one removes the distal bandage first and waits a few minutes before removing the proximal. We know from numerous experiments that cocaine and other drugs can be introduced in toxic doses providing an Esmarch has been placed. The drug after a certain period of time is changed in the tissues and loses its toxic effect.



FIG. 1

Petrow¹ has repeated these experiments with novocain, and has demonstrated that fifteen minutes is long enough to leave the central bandage on. If the operation has been a long one, and one has had to employ a great deal of the concentrated solution, the central bandage should be removed slowly, letting the artery loose first. Bier has had considerable experience with this method and is very enthusiastic. It is much simpler than the combination of Schleich's infiltration and Braun's intraneural method. Braun² brings a note of discord into this literature. Next to Schleich, Braun has done as much for this subject as anyone else. In this monograph, which covers all the details, he goes out of his way to discredit the work of Schleich. He is of the opinion that best results are obtained not by infiltration with the weak solution of Schleich, but by stronger solutions—0.5 per cent. novocain to which adrenalin is added, protected when possible by the Esmarch. He describes and pictures the intraneural method.

Stoll³ also prefers the addition of adrenalin preparations. Spischarny⁴ states that he has given up Schleich's method; he uses for injection 0.5 per cent. novocain, and prefers, during the operation, to wet the exposed tissues with a 10 per cent. solution of novocain. He reports on 383 operations under local anesthesia. He has already performed Bier's intravenous anesthesia in fourteen cases. James F. Mitchell⁵ gives a very good brief résumé of local anesthesia. He employs Schleich's

¹ *Centralblatt f. Chirurgie*, 1909, vol. xxxvi, p. 482.

² *Beiträge zur klinische Chirurgie*, 1909, vol. lxii, p. 644.

³ *Centralblatt f. Chirurgie*, 1909, vol. xxxvi, p. 485.

⁴ *Ibid.*, p. 688.

⁵ *Journal of the American Medical Association*, November 7, 1908, vol. li, p. 1582.

infiltration with weak solutions and combined with the intraneural. This is practically the method employed in Halsted's clinic, and I feel, from my experience, that it is less dangerous to employ the weaker solutions. Braun's statement does not appeal to me as yet, Bier's method, however, does. I think it will simplify the more extensive operations that one has to do on the extremities under local anesthesia.

Goyanes¹ has employed intra-arterial regionary anesthesia, using the Esmarch very much as does Bier, but injects into the artery instead of the vein.

Rectal Narcosis. In some operations upon the head, neck, and chest it would be convenient to be rid of the narcosis, and one naturally turns to hypodermic narcosis, which up to the present time we must exclude, so there is nothing left but the rectum. I have had no personal experience with it. The cases that I observed in the clinics of Boston and New York did not do well. I find, however, an encouraging report from Kadjan's clinic in St. Petersburg, by Anna Morosowa.² Their experience with 68 cases in five years was very favorable. It must be remembered, however, that it was never depended upon alone, in head and neck cases it was used to maintain narcosis after its introduction in the usual way. Apparently very much less ether was given per rectum. There were but two cases in which the anesthesia could not be maintained, and a few cases had bloody diarrhea after operation, but there were no fatalities. They urge the importance of a three-day preparation with castor oil, licorice powder, and enemata. The ether is introduced through a long tube, warm and in vapor form. Attention is called to the fact that Pirogow, in 1847, introduced the method; he had two deaths. Morosowa has been able to collect 308 cases with only one more death—by Weir, of New York, but Baum,³ stimulated by the good report of Dumont and Morosowa, attempted it in eight cases, with two deaths, both from hemorrhage, and in one case from gangrene of the cecum. Baum naturally thinks it is a dangerous method. Dumont and Baum's articles have been carefully reviewed in English.⁴ I am of the opinion that this method should not be employed except in properly equipped surgical clinics in selected cases. Further experience may prove that its dangers can be eliminated.

Spinal Anesthesia. On reading the results of even the most enthusiastic advocates of spinal anesthesia, I am convinced that they cannot compare with ether-drop narcosis. The two most complete reports of the year are by Rehn⁵ and Klose and Vogt.⁶ The latter is chiefly an experi-

¹ *Centralblatt f. Chirurgie*, 1909, vol. xxvi, p. 791.

² *Ibid.*, vol. xxxvi, p. 44.

³ *Ibid.*, vol. xxxvi, p. 369.

⁴ *Journal of the American Medical Association*, February 6, 1909, p. 515; and April 24, p. 1371.

⁵ *Mittheilungen a. d. Grenzgeb. d. Med. u. Chir.*, 1909, vol. xix, p. 806.

⁶ *Ibid.*, p. 737.

mental research, while Rehn discusses principally the practical and clinical side, with conclusions, it seems to me, practically excluding spinal anesthesia. He uses tropacocaine with Bier's technique; he advises against any attempt at high anesthesia, against its use in children and young adults, against its employment in lesions of the nervous system, arteriosclerosis, tuberculosis, and infections; it should never be employed if the operation can be done under local or general anesthesia. And then he adds that Bier's new method of intravenous anesthesia between rubber bandages will still further limit the application of spinal anesthesia.

Somewhat in contradiction to this clinical and experimental report from Rehn's clinic is the experience of Zahradnicky.¹ This surgeon in nine years has had 1650 cases. He employs stovain and Bier's technique, claims to have observed no bad effect upon heart, lungs, or kidneys (others have reported pneumonia and bad effect upon the kidneys); he has not operated above the clavicle, but when we come to study some of the cases in detail, we find 14 failures among 226 laparotomies.

Among other contributions which are worth while reading, if one is interested in this subject, are those by Stoeckel² on sacral anesthesia for obstetrical cases. Here the injection is made in the sacral canal below and outside the dura, avoiding the spinal cord. This is practically a perineural anesthesia. Zwar, Chaput and Pascalis, and Hollaender³ are rather enthusiastically in favor of this method.

In this country I find but one reference, Chassaignac,⁴ who, from an experience of 650 cases, is of the opinion that spinal anesthesia has a definite place.

Bier's latest description of his technique⁵ is well reviewed in the *Journal of the American Medical Association*, December 19, 1909, vol. li, p. 2196. It does not differ much from that already given by me in previous numbers of *PROGRESSIVE MEDICINE*. He employs, like Rehn, tropacocaine (many others prefer stovain and novocain); the ordinary dose is three-fourths of a grain; to this he adds suprarenin. Recently he has employed with satisfaction scopolamin-morphine as a preliminary to spinal anesthesia. Bier, however, makes one remark which makes me very skeptical as to the correctness of his comparison between spinal and general anesthesia. He states: "General anesthesia causes important disturbances which it is impossible to set down in statistics. This is shown by patients operated upon for cancer of the rectum under general anesthesia. They present afterward the picture of serious

¹ Archiv f. klinische Chirurgie, 1909, vol. lxxxix, p. 371.

² Centralblatt f. Gynäkologie, January 2, 1909, vol. xxiii.

³ Centralblatt f. Chirurgie, 1909, vol. xxxvi, pp. 505 and 506.

⁴ New Orleans Medical and Surgical Journal, January, 1909.

⁵ Deutsche Zeitschrift f. Chirurgie, 1908, vol. xcv, p. 373.

depression, while those operated on under spinal anesthesia do not seem to be sick at all afterward." I have had a very large experience with operations for carcinoma of the rectum under general anesthesia, and have never observed these disturbances which Bier states cannot be set down in statistics.

OPERATIVE TECHNIQUE.

The silence of recent literature on the subject of technique is pretty good evidence that surgeons are more or less satisfied. There is a tendency to simplify the sterilization of the hands and field of operation. We are beginning to find out that the most important point in the preparation of catgut is to start with good material.

Gloves. Heye¹ gives a method of preparing rubber gloves so that when they are sterilized they are dry. Compared with ordinary boiling, it is a long and tedious method with more opportunities for breaks in technique. I have used dry gloves, but could experience no advantage. I am of the opinion that we should abide by the sterilization of gloves by boiling, and this boiling can be done in the ordinary soda solution. Heusner² finds that boiling rubber gloves in glycerin injures them less, but I think that the expense of the glycerin, or the trouble of keeping the same glycerin for repeated boiling does not make it worth while. Glycerin, however, is good to boil silk catheters in.

Skin Disinfection. As before stated, there is a tendency to greater simplicity. Von Brunn³ now depends upon 96 per cent. alcohol alone. True, he uses rubber gloves, but he has discarded cleansing the skin of the field of operation with soap and water. The patient simply gets a bath the evening before. Von Brunn claims equal results from alcohol. I cannot, of course, dispute his results with alcohol, but when he states that the mechanical scrubbing with soap and water is harmful before the use of alcohol, because it brings out bacteria from the sweat glands and hair follicles, I do not agree with him, because for years I have employed, with many other surgeons, this mechanical method of disinfection followed by the chemical of which alcohol was a part, with uniformly perfect results. Whether equally good results would have been obtained by alcohol alone, I do not know.

Grossich⁴ paints the skin of the field of operation with *iodine*. He uses the tincture, which, of course, is an alcohol solution. Iodine is also a disinfectant. Microscopic study of a section of the skin so treated demonstrates that the iodine has penetrated into all the epidermal

¹ Centralblatt f. Chirurgie, 1909, vol. xxxvi, p. 573.

² Centralblatt f. Gynäkologie, April 24, 1909, vol. xxxiii.

³ Centralblatt f. Chirurgie, 1908, vol. xxxv, p. 39, Suppl.

⁴ Ibid., vol. xxxv, p. 289.

clefts and epithelium-lined ducts of hair follicles and glands. Watery solutions do not penetrate like the alcohol solution. Grossich was led to this employment of tincture of iodine by seeing its effect in recent accidental wounds. Here he found that if he painted not only the skin edge, but also the wound itself with iodine, he observed good healing when the wound was closed. This iodine method should be borne in mind. It is a very quick way of disinfecting a lacerated or incised wound, and may be a good method for the disinfection of the skin before the removal of small tumors.

The employment of *chirosoter* I discussed last year.¹ Klapp and Doenitz² confirm the experience of Meissner. They have employed this substance since August, 1907, in all cases with good results. The skin of the patient, the day before operation, is washed with a 3 per cent. alcohol solution of formol for three minutes; then just before operation this washing is repeated. Von Brunn, of course, would remark that the alcohol was the most important feature. After this treatment the skin is dried and then sprayed with *chirosoter*, which simply makes a covering of the skin fixing the germs beneath. Whether there is any particular danger of this cover breaking off and getting into the wound is not mentioned. The hands of the surgeon are washed in 70 per cent. alcohol after the usual soap and water, dried, and covered with *chirosoter* spray. This, therefore, is a substitute for rubber gloves. It does not appeal to me as a good one. These surgeons state that the iodine-benzine method of Heusner should not be employed preliminary to *chirosoter*.

Wederhake³ employs for the hands and field of operation *dermagummit* instead of *chirosoter*. It is a rubber solution containing iodine and tetrachlorcarbon, which belongs to the benzine group. In cleansing the hands and field of operation before using this cover, he substitutes for the benzine in the Heusner method, tetrachlorcarbon.

There is no doubt that with the older methods of skin disinfection and with the employment of rubber gloves practically perfect results in the healing of wounds have been accomplished. Surgeons close wounds without drainage and bury silk with impunity. We have, therefore, for practical purposes, accomplished all that could be desired. In beginning to simplify technique we must get equally good results. At the present time I am not prepared to recommend a curtailing of any of the usual precautions, but if these surgeons are getting the results they claim, for example, von Brunn with alcohol alone, they are accomplishing the same with simpler and quicker methods.

Disinfection of Instruments. Sometimes the boiling in soda is inconvenient, and we desire other methods. For cystoscopes and other in-

¹ PROGRESSIVE MEDICINE, December, 1908, p. 137.

² Centralblatt f. Chirurgie, 1908, vol. xxxv, Supplement No. 35, p. 41.

³ Ibid.

struments which cannot be boiled conveniently, one can have three deep jars—pure carbolic acid, alcohol and sterile salt solution, others prefer formalin to pure carbolic. For the removal of stitches I frequently employ pure carbolic and alcohol for a rapid method of sterilization. Saussailow and Telitschenko¹ make a very good suggestion which can be substituted for boiling and, I think, in many instances will be more convenient and, perhaps, much better for sharp instruments like knives and scissors. I have been so impressed with its value in military service that I have sent the reference to the Surgeon-General. What is needed is a metal box of the proper size, a piece of asbestos to fit into the box, and an airtight cover. The asbestos is moistened with alcohol, the instruments are placed on it, the alcohol is ignited; in about fifteen seconds the airtight cover puts out the flame, and, after cooling, the instruments are ready for use. These surgeons claim that the instruments are absolutely sterile and no injury is done to sharp instruments.

Catgut. It is my opinion now that the methods of obtaining catgut are more important than the methods of sterilization. Apparently we have many reliable methods of sterilization, but what is most difficult to obtain is a uniform catgut on which we can depend for pliability and strength. My experience with catgut as a routine for suturing material in closing abdominal wounds, etc., is not longer than three years. I still employ silk for ligatures and often for suture. I have never had an infection from catgut. During the first two years we had a large supply of gut; when this was exhausted we were unable to get the same commercial catgut. Now, occasionally, since then I encounter weak strands. Apparently this is the difficulty with all catgut, and I do not think that the question is by any means settled.

Kuhn and Roessler² advocate that the gut should be obtained sterile from cattle and treated in the fresh with iodine or silver. Chlumsky³ treats the commercial gut with a 1 per cent. solution of iodine and iodide of potassium five to six days and then places it in a solution of pure carbolic acid, one part, camphor, two parts, with the addition of a quantity of absolute alcohol. In this solution the catgut remains from five to eight weeks and can be used directly after rinsing in sterile water. Chlumsky advocated this solution before for the disinfection of wounds. The addition of alcohol and camphor destroys the irritating effect of carbolic acid.

Bertarelli and Bocchia⁴ discuss seventeen different methods of sterilizing catgut. They favor Claudius' iodine technique. Catgut keeps best in an alcohol solution of corrosive sublimate with an essential oil.

¹ Centralblatt f. Chirurgie, 1909, vol. xxxvi, p. 148.

² Deutsche Zeitschrift f. Chirurgie, 1907, vol. lxxxvi, p. 150, and vol. xcii, p. 185.

³ Centralblatt f. Chirurgie, 1908, vol. xxxv, Supplement No. 35, p. 43.

⁴ Policlinico, March 21, 1909, xvi, No. 12.

A. J. Ilyin¹ gives a very interesting résumé of his studies on the reabsorption of catgut in the various tissues. He uses two kinds of catgut: that sterilized by dry heat at 150° C., and Claudius' iodine method. In different tissues the same catgut was reabsorbed at different intervals, the shortest in the cornea—four to five days—the longest in the bladder, and the kidney. Every trace of catgut has disappeared within thirty days. The inflammatory reaction around catgut is not marked and cyst formation was not found. One, therefore, should be pretty skeptical when the agents for commercial drug houses claim they can give you a ten-day, etc., catgut. I think it can be safely stated that there are many good methods of preparing catgut, and I believe it would be a good plan to give up chromicized catgut.

FRACTURES AND DISLOCATIONS.

Operative Treatment. In the surgical section of the recent meeting of the American Medical Association in Atlantic City, Mr. Lane, guest of the Association from England, presented his well-known views on the operative treatment of fractures. His last publications will be found in the *Practitioner*, February, 1909, and *Surgery, Gynecology, and Obstetrics*, April, 1909. Mr. Lane, from 1894, has been a constant advocate, and has practised the immediate open treatment in practically all simple fractures. In the discussion at Atlantic City he made the statement that if surgeons could not persuade themselves to this view, the courts would soon drive them to it.

Whether we accept Mr. Lane's view in regard to all fractures or not, we still owe him a debt of gratitude for demonstrating that the results of the non-operative treatment for fracture are uniformly bad, except in the hands of experts.

It is my view that, before resorting to the operative treatment of all fractures, surgeons and the general practitioner should train themselves to get better results than have been accomplished heretofore by the conservative treatment. It is for this reason that I agree with Lexer,² who believes in the operative treatment when reduction of the fragments is difficult or impossible, or when it is easier to retain the reduced fracture by some form of suture.

The immediate operative treatment of fracture of the patella and olecranon has been settled for the great majority of surgeons. The consensus of opinion is approaching unanimity in regard to fractures of the shaft of the femur, and some fractures near joints, especially the elbow. I will take these up later in discussing the different fractures. The point that I wish to emphasize—by no means a new one in my

¹ Centralblatt f. Chirurgie, 1909, vol. xxxvi, pp. 466 and 572.

² Münchener medicinische Wochenschrift, 1909, No. 12.

reviews in *PROGRESSIVE MEDICINE*—is that practically perfect results should be obtained in recent fractures, and one who assumes the responsibility of the treatment should be able to select those cases in which operation only will accomplish the result.

It will be some years before the public is educated up to the fact that a fracture can be healed without deformity and without loss of function. At the present time the average layman is of the opinion that the treatment of a fracture of any kind requires no expert attention, while as a matter of fact the treatment of many fractures demand greater surgical ability and experience than many abdominal operations. The laity are not yet educated to the proper compensation for the treatment of fractures. They make no objection to a large fee for a simple abdominal operation done in a short time. In many fractures the responsibility is greater, the demands on the art and skill of the physician or surgeon are greater, and the actual time at the necessary frequent dressings is far in excess of that consumed in the ordinary abdominal operation.

As soon as the results of the men who are properly treating fractures reach the public, this publicity will force better methods throughout the profession, and I am inclined to think that more cases will be subjected to operative treatment, but by no means *all* cases. This is the stand that I have taken from the beginning of my contributions to *PROGRESSIVE MEDICINE*.

Leonard Freeman¹ gives the following conclusions:

1. No recent fracture should be operated upon that can be successfully treated by other means.
2. No recent fracture should be operated upon except under the most favorable surroundings and by an experienced surgeon who is a master of operative technique.
3. The resisting powers of the patient should be taken into careful consideration.
4. The patient's position and duties in life deserve attention.
5. The success of operative intervention depends much upon the accessibility of the fracture—the danger varying directly with the amount of manipulation required.
6. It should be recognized that faulty alignment and overlapping of fragments, or even the presence of visible deformity, do not always mean disturbance of function.
7. In estimating the value of an operation, the after-treatment deserves consideration; will it be rendered less trying to the patient or give a better result in a shorter space of time?
8. The indications for operation vary greatly with the particular bone which is broken, the character of the break, and its situation in the bone.

¹ *Surgery, Gynecology, and Obstetrics*, 1909, vol. viii, p. 120, and *Colorado Medicine*, March, 1909.

9. Admitting the desirability of operating in certain carefully selected cases, it must not be forgotten that there are two important drawbacks—delayed union and sepsis.

I believe Freeman exaggerates the danger of delayed union and sepsis, if the other indications are met. I doubt if he has experienced them in his own hands. By a surgeon qualified to operate, delayed union and sepsis need not be considered.

Lewis A. Stimson,¹ in his paper before the Medical Society of New York, takes a very decided view against the operative treatment of fractures. I abstract the following from the review of his paper in the *Journal*: The reasons given in favor of the general adoption of operation in simple fracture of the shaft of a long bone are that it assures accurate adjustment of the fragments and its maintenance by suture. . . . Accurate adjustment of the fragments is of no great value unless it can be maintained, and its maintenance by suture and other direct fixation is uncertain. If the grip of the suture is not slack it will surely break. (Surgeons who operate do not use a suture, but a plate with screws, and the fixation is certain if properly done.) The value of the adjustment appears to consist mainly in the removal of interposed soft parts or small fragments, which if not removed delay or prevent reunion or cause persistent deformity. The removal of possible obstacles to reunion is an argument in favor of operation. (This apparently is the only argument conceded by Stimson.) Repair is slower after an operation in which the fragments have been temporarily still further displaced as has to be done by the placing of suture. (My own experience does not confirm this statement of Stimson.) The manipulation necessary in drilling and suturing fragments delays union probably by additional injury to periosteum. (If there were no fracture there would be no new periosteal bone; additional injury about the fracture, I can prove by *x*-rays, if properly inflicted, increases the rapidity of union.) The importance of the advantage of early operation is not great.

Other arguments against the operative treatment are given. If the operation for fracture is performed by an experienced surgeon, I do not believe any of the arguments of Stimson will hold. But I wish to emphasize that Stimson's position, like Helferich's, is taken against the operative treatment of fracture, because they do get good results in many cases. It is my opinion that the bad results in many fractures not operated upon are not due to the failure to operate, but to the failure to properly reduce under anesthesia in the first instance and the failure to maintain the fragments and apply the proper dressing with treatment by passive motion and massage in the second instance.

It is also my view that one who does not understand the non-operative treatment of fractures is also not qualified to treat it by operation.

¹ *Journal of the American Medical Association*, February 20, 1909, vol. lii, p. 656.

The question, therefore, must be settled by the study of single fractures. The results of operation must be compared with those after conservative treatment.

This comparison must embrace the anatomical, the *x*-ray pictures, the functional result, the period of disability, the deformity, and other minor factors, like comfort and cost.

In those cases in which ether must be employed for reduction, an operation at the same time, of course, gives no added risk or discomfort. The closed wound does not interfere with the treatment.

Fractures of the Neck of the Femur. My own experience now confirms the position of Royal Whitman—that reduction under anesthesia and fixation in the forced abducted position of both thighs is the best method of treatment for a recent case of fracture of the neck of the femur. The only perfect anatomical and functional results which I have ever observed have been after this treatment suggested by Whitman. During the same time, in Baltimore, I have been able to compare the results by the usual extension treatment. There is no comparison. I almost feel that I should write that the extension treatment for a fracture of the neck of the femur is unjustifiable. The details of the abduction treatment have been given in a previous number of *PROGRESSIVE MEDICINE*. Whitman,¹ in his most recent article, summarizes his well-known views on the distinction between a fracture of the neck and epiphyseal separation. He is of the opinion that epiphyseal separation is less frequent than fracture up to ten years of age; after ten, perhaps the epiphyseal separation is more frequent.

This view is not shared by German authorities. Hoffa, in 1903, was able to find but four fractures as compared with eighty-three epiphyseal separations. Haldenwang² collects all the true fractures of the neck of the femur in infancy and youth—twenty-three cases. He only considers those in which the diagnosis has been confirmed by *x*-rays or operation. Many of these cases have been previously discussed in *PROGRESSIVE MEDICINE*. Whitman is of the opinion that if, after an injury to the hip, there is immediate loss of function and the usual picture of a fracture, it is not an epiphyseal separation, but a fracture; that in the epiphyseal separation the loss of function comes on more slowly, that is, we have the clinical picture of coxa vara traumatica. Davis³ reports a case in which he nailed a recent intracapsular fracture of the neck of the femur. In these communications he makes the statement that the treatment for fractures of the neck of the femur is by no means standardized as yet.

¹ New York Medical Record, January 2, 1909.

² Beiträge zur klinischen Chirurgie, 1908, vol. lix, p. 81.

³ American Journal of Orthopedic Surgery, 1909, vol. vi, p. 481; Annals of Surgery, 1908, vol. xlvii, p. 469.

Forbes¹ discusses the different methods of non-operative treatment. He is willing to recommend Whitman's abduction for strong, robust people, but not for older, weaker patients; here he prefers extension. Wilson² gives a very good résumé of the literature and some interesting cases of nailing for ununited fracture of the neck of the femur. Flint³ presents a very thorough article on the operative treatment of fracture of the neck of the femur, while Ashhurst and Newell⁴ present a study of 121 recent fractures of the femur treated during the last three years at the Episcopal Hospital in Philadelphia. Among these, in 58, the fracture was in the neck. They claim 20 cures, but non-union was probably present in 8 cases. I am inclined to think that Drs. Ashhurst and Newell look upon a patient as cured when he can walk without crutches, although there may be shortening and adduction.

The literature of the year on this form of fracture is not particularly satisfactory. What we need is a very careful study of the actual ultimate results. I can only say, from my own experience, that I have been able to employ the abduction treatment successfully in all cases of recent fracture in which any treatment at all was possible. Those in which no treatment was instituted died of alcoholism or nephritis. I have observed not a single example of non-union; all of the patients walk without crutches, some show perfect anatomical and functional results; a few are perfect functionally, but not quite anatomically. For older, ununited fractures nailing of the fragments after freshening the ends should be done. I have had one successful case in which the interval was three years between the fracture and my operation. As the fracture was near the trochanter, there was very little atrophy of the neck. In those cases of ununited fracture in which the neck is practically atrophied and there is nothing left but a piece of head, I do not think anything can be accomplished by nailing. It is a question what to do with these cases. I have just seen one patient six months since the fracture; she has no pain, walks with crutches; there is, of course, no restriction of motion at the hip-joint; she can sit down with comfort. It was my opinion that an operation could offer her very little. As her occupation was that of book-keeper, I was of the opinion that she would be more satisfied to walk on crutches and sit down in comfort with a movable hip than to walk without crutches and have the discomfort of a partially or completely stiff hip, which results after the excision of the head if there is to be any strength in the hip-joint.

I look upon this fracture of the neck of the femur as one of the most important problems in fractures. At the present time I would advise the abduction treatment: reduce the fracture under ether; if an x-ray examination shows that the approximation is not perfect, an operation

¹ American Journal of Orthopedic Surgery, 1909, vol. vi, p. 471.

² Ibid., 1908, vol. v, p. 339.

³ Annals of Surgery, 1908, vol. xlviii, p. 729.

⁴ Ibid., 1908, vol. xlviii, p. 748.

should always be performed in children and strong adults; in older people it will depend on their general condition. I am rather inclined to the view that as one becomes more expert in this method, operation will be less frequent. In some of the epiphyseal separations in children it may be necessary to open the capsule to properly reduce. In fractures seen later and ununited, operate, if the atrophy of the neck is not too extensive. For cases of fracture of the neck of the femur united in bad position the treatment is the same as for coxa vara.

Dislocation of the Femur. Among the more interesting of these dislocations are the so-called central, in which the head of the femur is forced through the acetabular cavity into the pelvis. Henschen,¹ from von Bruns' clinic in Tübingen, contributes a monograph with practically all the literature. He was especially interested in this fracture in pregnant women and was able to find thirty-one cases. The most important point is that the patient should be kept in bed for two or three months, the limb should be reduced, but no attempt should be made to push the head of the femur back, with the hand in the rectum. After the head has been reduced by extension one can place the fingers in the rectum and gently make manipulations to reduce the fragments of the acetabulum.

The same principles, therefore, are to be followed in this fracture-dislocation as is now known to be most important in fracture of the head of the femur, namely, prolonged rest. In fracture of the neck of the femur some authorities are of the opinion that the patient should use crutches for at least one year.

CONGENITAL DISLOCATION OF THE HIP. Among all dislocations, acquired and congenital, that of the hip has received the most attention. The interest keeps up in recent literature. At the present time apparently the majority of orthopedic surgeons favor the non-operative, or bloodless method of reduction. This is shown in the remarks of Osgood² on Albert Hoffa. Hoffa practically originated the open operation, and naturally he was partial to it, yet his wide experience convinced him finally of the greater advantages of the bloodless method. Every surgeon should bear this in mind before deciding in favor of an operation for reduction.

In some cases apparently operation is inevitable. Ludloff,³ whose authority cannot be questioned, after stating that the unbloody treatment of congenital dislocation of the hip is the most satisfactory accomplished fact of orthopedic surgery, remarks that in a few cases, perhaps two out of a hundred, reduction cannot be made after Lorenz's method. In these cases he has operated. The operation is interesting, because it attacks the joint from an entirely new position—through the

¹ Beiträge zur klinischen Chirurgie, 1909, vol. lxii, p. 294.

² American Journal of Orthopedic Surgery, August, 1908, vol. vi, p. 7.

³ Zeitschrift f. orthopädische Chirurgie, 1908, vol. xxii, p. 272.

adductors. The patient is first fixed in plaster, the legs in marked abduction, hyperextension and outward rotation for about three to four weeks. Then in this position, the patient is anesthetized, a skin incision made over the adductor magnus, the capsule of the hip-joint exposed by blunt dissection and opened. This gives one an unusually good opportunity to inspect the acetabular cavity and, on manipulating the limb according to the Lorenz method, to ascertain the factors which prevented reduction. This, as a rule, is a connective-tissue membrane with an opening like a pupil in the iris which Bradford described many years ago. This is divided, and then with a bone hook the head is drawn into the acetabular cavity. Theoretically, the only danger is the bad position of the incision near the rectum and urinary tract. Ludloff protects it by absolute closure of a dry wound, placing the patients on their abdomen, and keeping the bowels closed for a few days. In my experience, incisions in this region have healed well. They can be easily protected by silver foil, collodion, and adhesive straps.

Ludloff's cases have not been followed long enough to judge of the ultimate results. The *x*-rays show an anatomical reduction.

Joachimsthal¹ calls attention to the possibility that a coxa vara may develop after a successful reduction of congenital dislocation. His three cases were between two and six years of age. He believes that the softening of the bone is favored by long immobilization, and for this reason he recommends shortening the time of immobilization, and treatment with massage and exercises in abduction and extension. Of course, we must bear in mind that some cases of congenital dislocation are associated with coxa vara.

Froelich's² report on the ultimate results brings out some new and interesting facts. He has had an experience with 230 cases, and claims that 30 per cent. were completely cured and 50 per cent. almost so. Among the 70 cases looked upon as completely cured, 10 returned later, that is, in 15 per cent. of the apparently cured cases complications have developed. As one looks over these complications there is only one which seems to me can be prevented, that is the coxa vara to which attention has just been directed from Joachimsthal's paper. Froelich's 10 cases were as follows: 4 cases of coxa vara, 2 of total disappearance of the neck (I am inclined to think these may have been due to coxa vara), 2 cases of tuberculosis, 1 of traumatic dislocation, and 1 of infantile paralysis. The last 4 cases undoubtedly were accidental diseases, and could not have been prevented.

Peltesohn³ demonstrates from his study of paralysis due to traumatism at the time of the bloodless reduction that this complication practically never takes place when the patient is brought to operation at a

¹ *Munchener medicinische Wochenschrift*, March 30, 1909, vol. lvi, p. 644.

² *Zeitschrift f. orthopädische Chirurgie*, 1908, xxii, p. 277.

³ *Ibid.*, 1909, vol. xxiii, p. 222.

suitable age. His age limit is ten years for unilateral and seven for bilateral cases. This is an old argument, but here is a collection of a great number of facts. Drehmann¹ states as the conclusion of his study: 'The bloodless method has come to stay; all cases are curable if seen early enough; in bilateral cases every month after the second year adds to the difficulty of reduction.'

The monograph of P. Le Damany,² from the University of Rennes, on congenital dislocation of the hip, is too extensive for review. It is considered from the standpoint of comparative anthropology. The study represents a very extensive investigation, with the conclusion that this dislocation of all others is based upon an anthropological ascent. The deformity is more common in the higher races and in females. The following is a translation of the author's conclusions: "Every human fetus deforms itself before birth by excessive flexion of the hips, in order to adapt itself to the maternal uterine space. Every child deforms itself by excessive extension in the hips, in order to adapt itself to lie on the back and maintain the upright position. This double deformation becomes greater with the anthropological ascent. The danger to which it exposes the human race is the congenital anthropological dislocation of the hip."

Le Damany was very gratified that his tedious and painstaking anthropological investigation led to practical results in regard to treatment. He is of the opinion that, after the reduction of the head of the bone into the acetabular cavity and before the bandages are removed, something must be done to correct the mutual relation between the acetabular cavity and the head and neck of the femur; this can be easily accomplished, he says, by twisting the femur so that normal relations are established.

His method³ consists in keeping the reduced hip in forced flexion and abduction for from seven to ten months. The flexion is at right angle. This position of flexion and abduction, Le Damany is of the opinion, is best for the adaptation of the joint surfaces, for the deepening of the acetabular cavity and for the detorsion of the neck of the femur.

Another contribution by Preiser⁴ is along somewhat similar lines. We have discussed in *PROGRESSIVE MEDICINE* *coxa valga*, first described by Lauenstein in 1890. I reviewed the splendid monograph of Albert. These contributions considered the acquired form, and the common etiological factor was an absence of the weight-bearing function of the limb brought about by amputation or disease. *Congenital coxa valga*, previous to the paper of Preiser, has been considered but by two authors: David in 1904 and 1907, and Preiser's former teacher, Drehmann, in

¹ Zeitschrift f. orthopädische Chirurgie, 1908, vol. xx, p. 61.

² Ibid., vol. xxi, p. 129.

³ Revue de Chirurgie, 1909, vol. xxviii, No. 10.

⁴ Zeitschrift f. orthopädische Chirurgie, 1909, vol. xxi, p. 177.

1906. I emphasize these interesting studies on the etiological factors of congenital dislocation, to bring out the chief point in the practical application, that is, the early recognition and reduction. David, Drehmann, and Preiser have demonstrated that coxa valga may be of congenital origin, and is probably a preliminary stage to congenital dislocation, and this seems to confirm the results of the anthropological studies of Le Damany.

Wollenburg,¹ after a most elaborate study, comes to the conclusion that heredity plays a very important part in the etiology of congenital dislocation. This was the opinion of Le Damany.

Coxa Vara. Drehmann² describes coxa vara adolescentium as a change in the angle between the head and neck of the femur, and not a bending in the neck. He does not agree with Sprengel as to the traumatic origin, nor that it is due to late rickets, but he has found in three recent cases a deformity of the other hip which he thinks predisposes to this burdening deformity—coxa vara. In his cases there was the usual previous history of pain and slight limp, then the acute symptoms after a slight injury. The deformity which he found in the opposite hip was anteversion of the head. As to treatment, he still uses the method which he advised many years ago—forced position of abduction in plaster.

Beginning with my first contribution to PROGRESSIVE MEDICINE, December, 1899, I have kept up a pretty continuous critical review of the literature on this subject, and it is one of the few subjects in which it has been possible to start the description at the beginning. It was such a new condition in 1899 that I began with the first contributions of Müller and Hofmeister. Drehmann's view agrees, therefore, with the original view of Müller, which had been largely superseded by Sprengel's conception that it was a traumatic epiphyseal separation.

Kempf,³ writing from Sprengel's clinic, naturally reflects his views, and the statement that there is no other etiological factor, except traumatism, demonstrates that Sprengel has not changed his conception. Kempf emphasizes the importance of early and prolonged treatment. The prognosis for late cases, or early cases in which the treatment is not kept up, is bad. The diagnosis is not difficult. Always think of coxa vara in every patient who, during adolescence, complains of any symptom which can be referred to the hip.

The symptoms of coxa vara may, on the other hand, be a sign of a general disease of the skeleton. Ortloph⁴ is quite confident, from a study of two living cases and five skeletons, that coxa vara may be a very early symptom of *osteomalacia*.

¹ Zeitschrift f. orthopädische Chirurgie, 1908, vol. xxi, p. 232.

² Centralblatt f. Chirurgie, 1909, vol. xxxvi, p. 311.

³ Archiv f. klinische Chirurgie, 1908, vol. lxxxv, p. 784.

⁴ Wiener klinische Rundschau, 1900, Nos. 33 to 36.

There is a very interesting study of the changes in the pelvic acetabulum in coxa vara infantum by Theresa Savini-Castano.¹ In Helbing's clinic she was able to study the x-rays of one hundred cases, and concludes that one could differentiate between the two groups of coxa vara infantum: the true congenital type and that associated with infantile rickets. She finds in the congenital type definite changes in the pelvis.

Measurements to Show the Relation between the Trochanter and Anterior Iliac Spine. For a graphic representation, to illustrate whether the trochanter has been displaced upward or downward, Schoemaker, of Hague,² has devised what he calls the trochanter-spina line. If a line is drawn through the trochanter and anterior iliac spine and projected to the middle line of the body, it should meet a similar line of the other side in about the middle line, either above, or below, or near the umbilicus. It is the intersection of these two lines in the median line that can be looked upon as a graphic demonstration that the trochanters

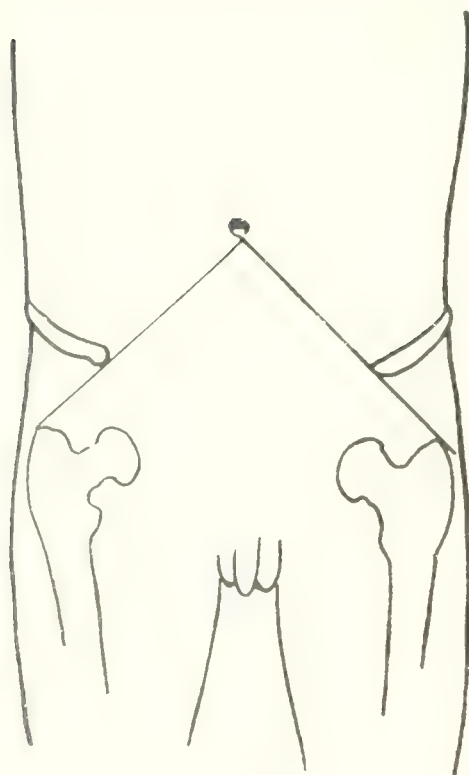


FIG. 2

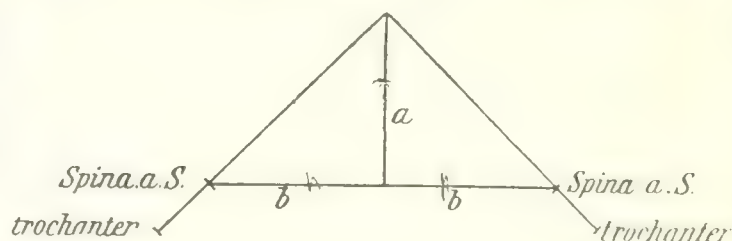


FIG. 3

of the individual are in relatively the same position. When the trochanter moves up as in a fracture, the other end of the line moves down and naturally crosses the median line at a point lower than the normal line. As the distance between the anterior iliac spine and the middle line is about three times that of the distance between the trochanter and the anterior iliac spine, this difference on the median line between the two trochanter-spina lines will be three times greater than the upward displacement of the trochanter.

This trochanter-spina line is shown in Fig. 2. If the two anterior spines are connected with a line there will be traced on the abdomen two triangles, as shown in Fig. 3. As a rule, in the normal, a is about equal to b ; in children a is a little greater than b , and in adults a little less, but the relation between the lines a and b of the triangles need not be considered. The point to be measured is the distance between

Zeitschrift f. orthopädische Chirurgie, 1909, vol. xxiii, p. 158.

Ibid., 1908, vol. xix, p. 465.

the two points at which the two trochanter-spina lines cross the middle line. In coxa valga, in which the trochanter drops downward, as shown in Fig. 4, the line on the affected side may intersect the median line as high as the sternum, while in some cases of fracture of the neck of the

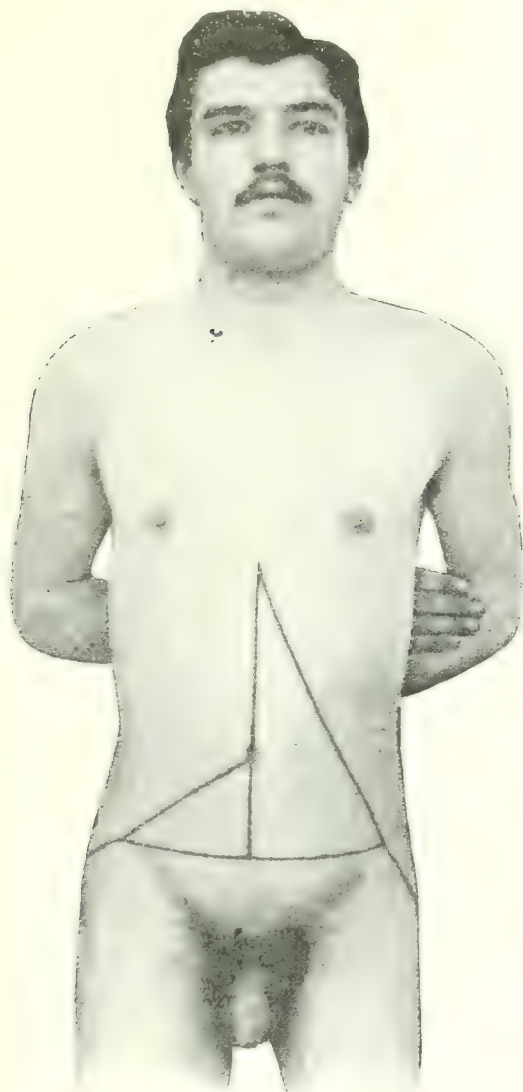


FIG. 4

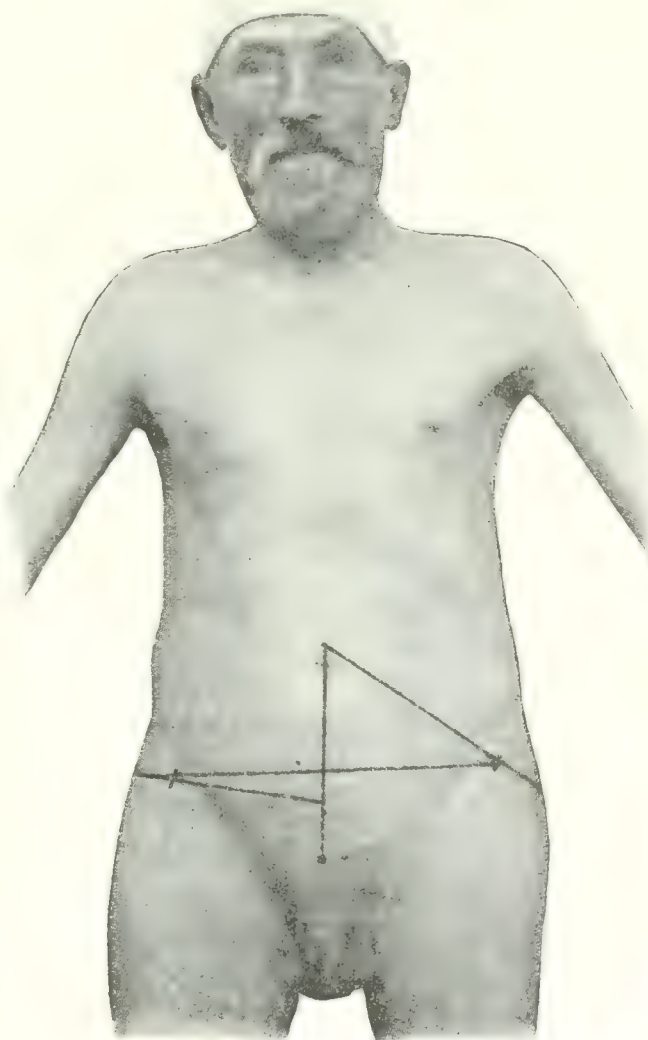


FIG. 5

femur (Fig. 5) the line may intersect the middle line below the horizontal between the anterior iliac spines.

I have tested this recently in a case of fracture of the neck of the femur, and look upon the method as a very important one for teaching purposes.

Tear Fracture of the Trochanter Minor. Hoch's observation from Wilms' clinic in Basel¹ is of interest, because, so far as I know, it is the first *x*-ray picture of this fracture, and of further interest because the observations of this case demonstrated a perfect functional result, although the *x*-rays showed a still dislocated trochanter minor. Hoch's patient was a boy, aged seventeen years. The nature of the injury sug-

¹ Deutsche Zeitschrift f. Chirurgie, 1909, vol. xcvii, p. 405.

gests sudden weight being thrown upon one or both lower limbs, because on this young adult a heavy piece of marble fell striking his head and left side. On examination, there was tenderness in the region of the left hip and great trochanter. There was no voluntary motion in the hip-joint at all, and very little passive motion. There were none of the signs of fracture of the neck of the femur. The diagnosis was made by the *x*-rays. Hoch was able to find but two other cases in the literature: Wilmart, quoted by Krueger,¹ who considers the isolated fractures of the major trochanter, and Julliard.² Wilmart's patient was a male, aged seventy-two years; the fracture was found at autopsy one year after the injury; there was also a fracture of the great trochanter. In this case the diagnosis had been fracture of the neck of the femur. Julliard's observation was also made at autopsy in a male, aged eighty-two years. Clinically, in this case Julliard calls attention to outward rotation, not present in Hoch's case. Fracture of the neck of the femur was also the diagnosis in this case. Julliard gives illustrations of the specimen, and his may be looked upon as the best study of this fracture in the adult.

Stimson,³ in his practical *Treatise on Fractures*, reports two cases, Bennett,⁴ and Hutchinson.⁵ The latter's specimen was obtained by Dr. Fenwick, of Montreal, from a boy, aged seventeen years, who died of septicemia seventeen days after the accident. This specimen is still in the Museum of McGill College. The age of the patient in Bennett's case is not given by Stimson. In this instance there was also a fracture of the neck of the femur, and the minor trochanter is pulled off with a small piece of the shaft. Hoch states that the fracture should be more common in individuals under eighteen, because up to this time the trochanter minor has not ossified.

Fractures of the Shaft of the Femur. Although Bardenheuer claims excellent results from extension, as demonstrated by the last report written by Graessner,⁶ von Brunn⁷ also is satisfied with the extension treatment for spiral fractures of the shaft of the femur. In *PROGRESSIVE MEDICINE*, December, 1905, p. 219, I ventured the opinion that operation in the recent state should give a better result, especially with less shortening. Lane⁸ is decidedly of the opinion that the operative treatment is indicated in fractures of the shaft of the femur. Huntington, of San Francisco,⁹ in his excellent paper in which he, on the whole,

¹ Deutsche Zeitschrift f. Chirurgie, 1906, vol. lxxxiii, p. 464.

² Archiv f. klinische Chirurgie, 1903, vol. lxxii, p. 83.

³ Lea Brothers & Co.

⁴ British Medical Journal, October 12, 1895, p. 893.

⁵ Ibid., December 30, 1893, p. 671.

⁶ Centralblatt f. Chirurgie, 1906, vol. xxxiii, p. 703.

⁷ Beiträge zur klinischen Chirurgie, 1904, vol. xlv, p. 655.

⁸ Loc. cit.

⁹ Annals of Surgery, September 1908, vol. xlviii, p. 420.

favors immediate operation for this fracture, gives a point in technique which I found of the greatest value. This is illustrated in Fig. 6. The

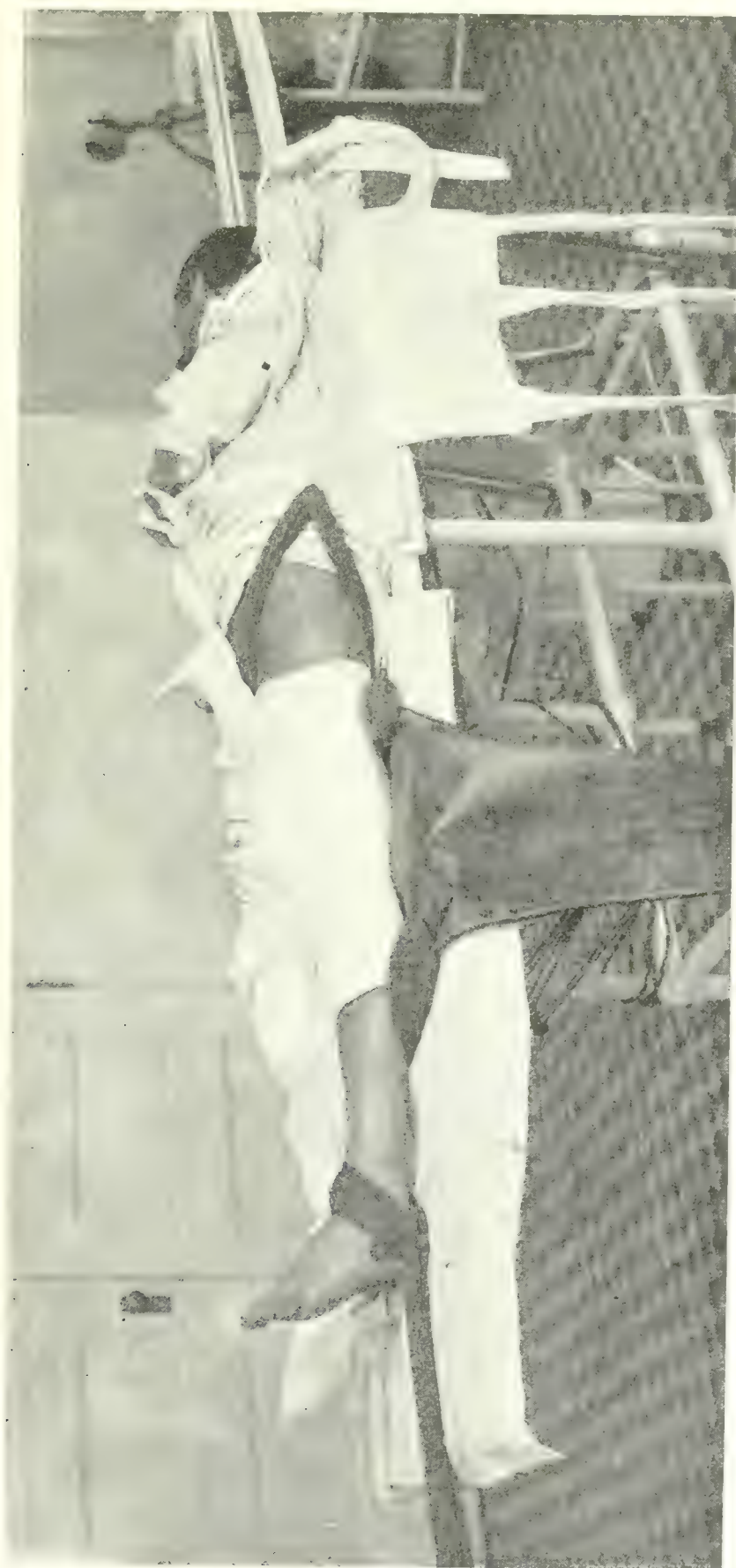


FIG. 6

apparatus here is for extension and counterextension during the operation for fracture of the femur. The perineal counterextension is from a skein of heavy woollen yarn passed over each thigh. The extension is made by a similar scheme fixed to the ankle or the knee by a clove hitch.

Extension in Fractures. It is more appropriate here, with fractures of the shaft of the femur, to discuss extension as a method of treatment. Granted that extension would give an equally good result in all fractures in which it is indicated, I am of the opinion today that if I had a fracture requiring the more difficult method of extension for its treatment, I would choose immediate operation. At the present time I am inclined to the opinion that immediate operation makes the responsibility of the surgeon easier and the convalescence for the patient more comfortable, but there is no question that, properly applied, extension will accomplish wonderful results. In Germany the extension treatment of fractures has reached a much higher state of perfection than in this country. It must be remembered, of course, from an historical standpoint, that the Buck's extension was an American product.

Richter,¹ of Chicago, has contributed a point in the right angle extension in fractures of the shaft of the femur in children of great practical value.

The overhead trolley with its supporting bars is fixed to the Bradford frame. This allows the child to be carried anywhere. I have had a moderate experience with fractures of the shaft of the femur treated by this method—all with good results. If one operates in a case of this kind, the same extension treatment would be indicated. So, if the *x*-rays show good reduction, operation is not indicated. I have just seen a case in the ward of the Johns Hopkins Hospital with Dr. Gatch, one of the assistant resident surgeons. The child was being treated as shown in Fig. 9. The *x*-rays show perfect position of the fragments; the child is comfortable, although less than fourteen months of age. I cannot see what could be gained by fixing the fragments through an open incision. With the adult, however, there are cases in which, in my experience, the extension is so difficult that one prefers not to be bothered with it. However, I think it is of the greatest importance to present here the present status of the extension treatment in Germany.

Before the German Surgical Congress, in 1898, Kroenlein demonstrated by means of a manikin the extension treatment which had been employed in his clinic for the two previous years. It was devised by Zuppinger, and is called Zuppinger's automatic extension beds for the treatment of fractures of the thigh and leg. Since this introduction two articles have appeared from his clinic in Zurich. The first is by Henschen.² This

¹ *Surgery, Gynecology, and Obstetrics*, 1909, vol. viii, p. 189.

² *Beiträge zur klinischen Chirurgie*, 1908, vol. lvii, p. 616.

is a very extensively illustrated contribution, and goes into all the details. The new principle, or, rather, the old principle revived, is that of semi-flexion. This relaxes the muscles and reduces the weight necessary for extension. In Nathan R. Smith's¹ anterior splint this principle of flexion was employed. Zuppinger's apparatus, on the whole, is simpler than Bardenheuer's, and the principle of flexion is one that has been tested by experience. I reproduce here a few of the illustrations which I think will make the average practitioner or general surgeon take a prejudice on account of the apparent complexity of the mechanical apparatus.

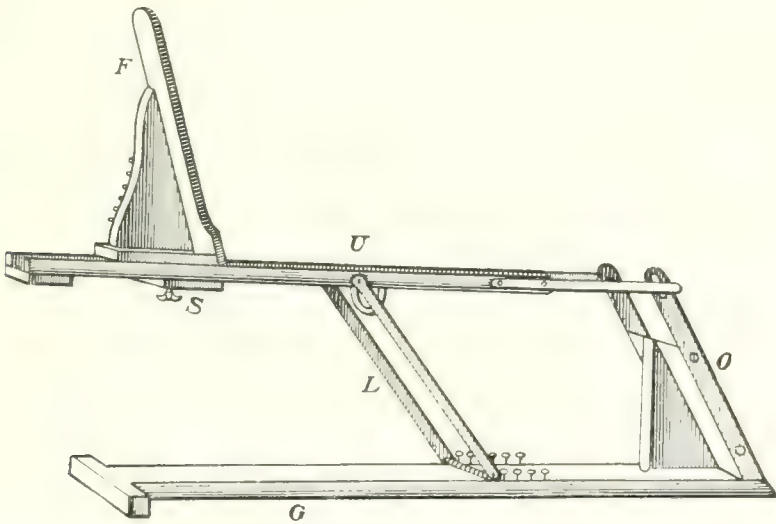


FIG. 7

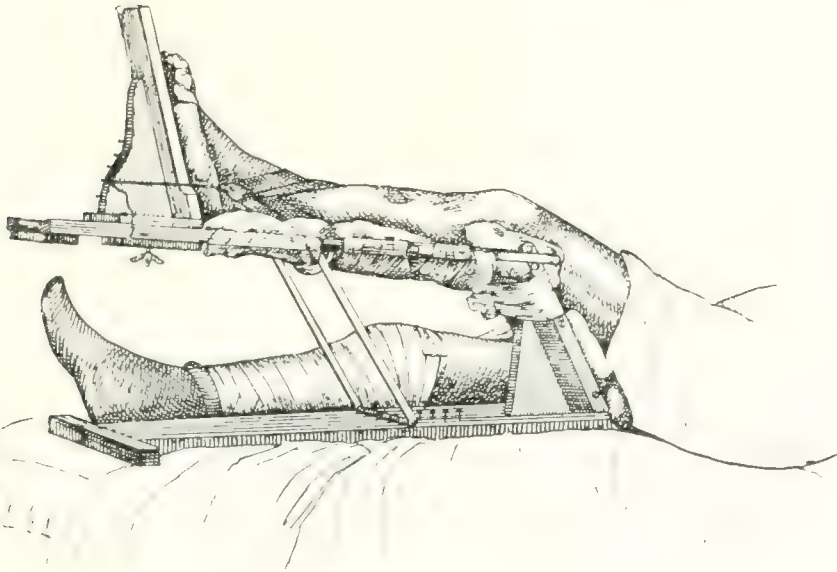


FIG. 8

Fig. 7 illustrates Zuppinger's apparatus for fracture of the leg, and Fig. 8 the apparatus in position. *O*, the groove for the thigh; *U*, which is padded, the groove for the leg; *F*, foot board with screw *S* for adjustment; *G*, the basal support; *L*, the arm regulating the flexion supported

¹ Stimson, *Fractures and Dislocations*, Lea Brothers & Co., 1899, Fig. 34, p. 88

by the nails. We have in this apparatus the principles of Petit's fracture box.

I have had a fairly large experience with fractures of the leg, and have been able to get good results without such an apparatus. Figs. 9 and 10 represent the apparatus for fractures of the thigh. This is extension in an inclined plane very much like Esmarch's double inclined plane. I am reproducing here the older apparatus, because they can be used in an emergency with almost equally good results. Another apparatus for the thigh and leg, in which flexion is employed with a modified hammock to swing the leg, is shown in Figs. 11 and 12.

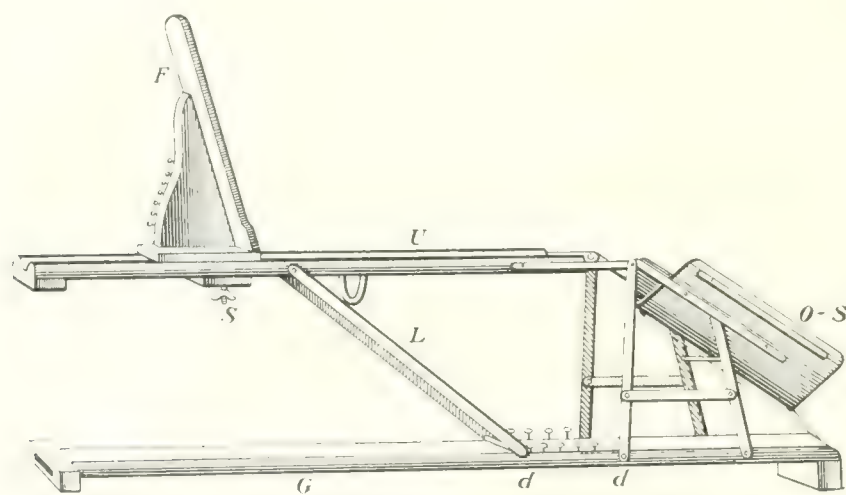


FIG. 9

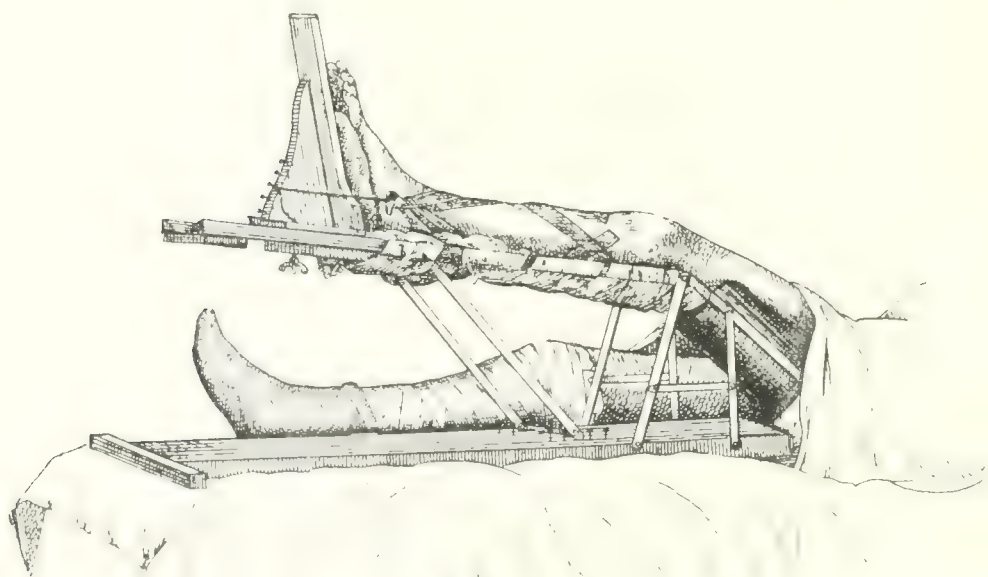


FIG. 10

These pictures will give one an idea of the method of extension in flexion. If one has the ingenuity to employ Zuppinger's apparatus, the same ingenuity will allow him to devise an apparatus of his own in which the same principles are borne in mind.

The results of this method of treatment are given later by Wettstein.¹ There is one thing that Kroenlein claims for Zuppinger's method of extension, that is, anatomical as well as functional results, while Barden-

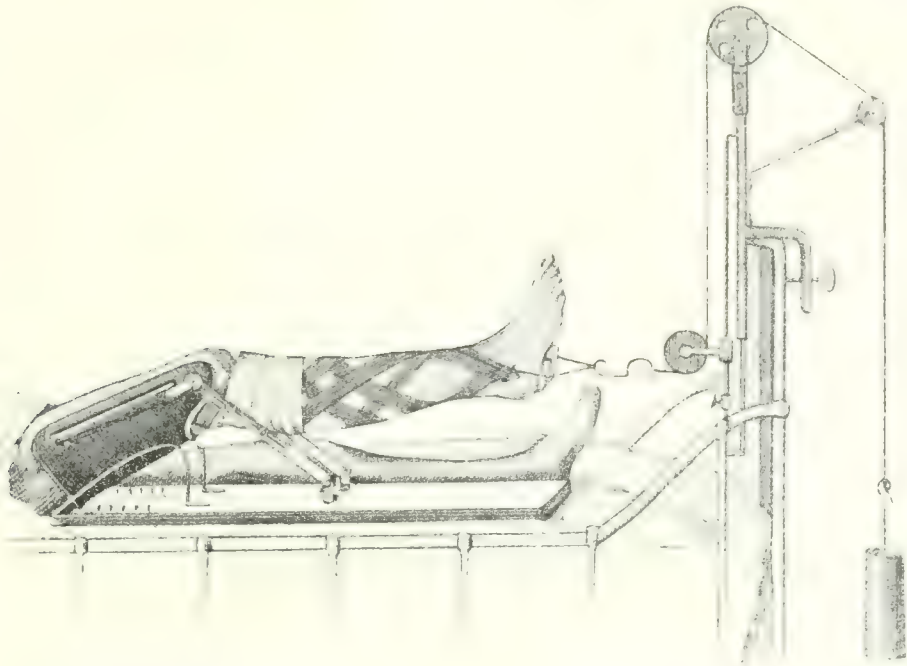


FIG. 11

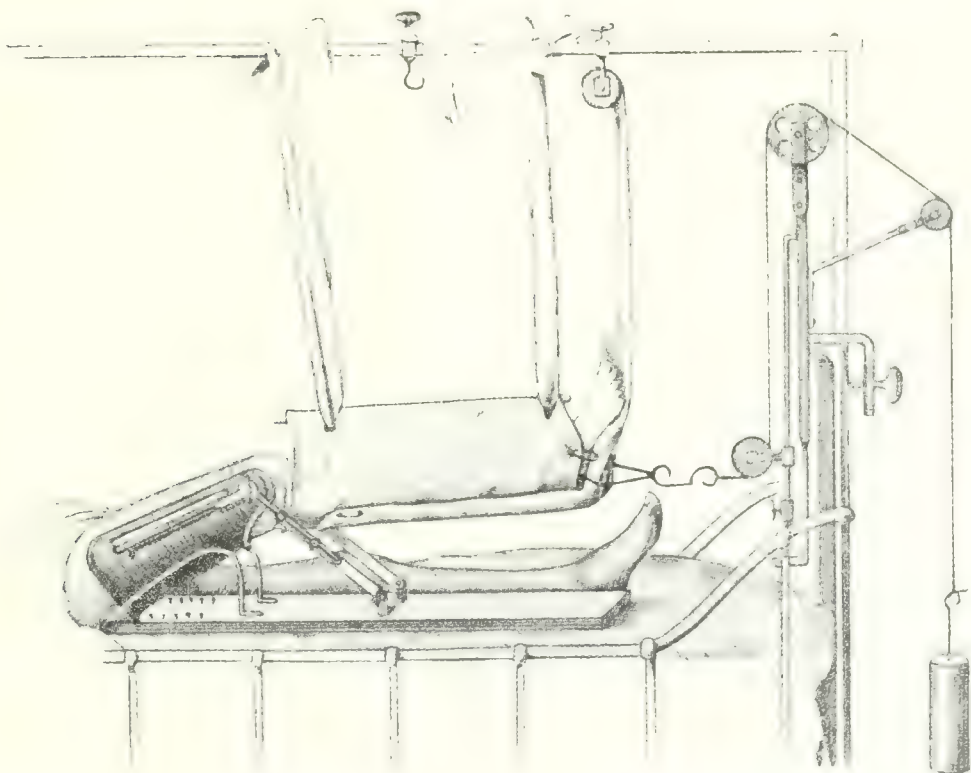


FIG. 12

heuer frequently claims for his only functional. The point that I wish to make is this: That the present experience with fractures demonstrates

¹ Beiträge zur klinischen Chirurgie, 1908, vol. ix, p. 684.

that one should get both good functional and anatomical results, and if you cannot get them by conservative means, operation is indicated. Both require experience. There are as many difficult wrinkles in the technique of operative reduction and fixation as there are in proper extension.

EXTENSION BY NAILING THE LOWER FRAGMENT. Steinmann,¹ a practitioner in Berne, Switzerland, has devised a simple method of extension which appeals to me as one which can be employed to advantage in certain selected cases. I should hesitate to recommend with Steinmann its substitution for adhesive-plaster extension in *all* cases.

The method is as follows: Nickel-plated steel nails, as shown in Fig. 13, are driven into each condyle of the femur obliquely with the usual surgical precautions and cleanliness. About the head of the nail ordinary wire is placed, or some special attachment, such as a picture hook (Fig. 14), is used. Extension is applied directly to the lower fragment. Steinmann has employed this in other bones where extension was necessary.

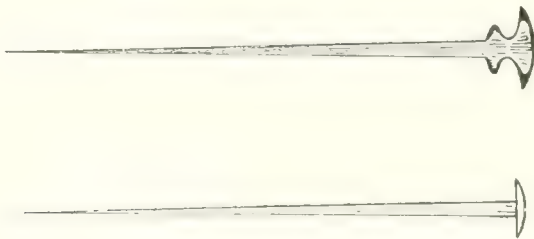


FIG. 13



FIG. 14

He claims that there is no irritation about the nails driven through skin and bone, and special precautions to prevent infection are not necessary. As he states, in compound fractures it is frequently impossible to employ adhesive straps. This method of Steinmann is undoubtedly a good substitute here. It occurs to me now that during operations, especially for fractures of the femur, these nails would be the simplest method of extension.

Ernest Becker² is of the opinion that the nail should pass through the bone, and he has devised a steel rod 20 cm. long and 4 mm. in thickness which is driven through skin and bone by an electric augur. It has side attachments which screw on, as shown in Fig. 15. These keep the bar in place and provide attachments for the extension wire. Steinmann³ again publishes an article after two years' experience. In the meantime he has answered Becker and the criticisms of the Zuppinger school of extension. We are not interested, of course, in these controversies, but the method appeals to me as one which may have practi-

¹ Centralblatt f. Chirurgie, 1907, vol. xxxvi, p. 938.

² Ibid., 1908, vol. xxxv, p. 1417.

³ Ibid., 1909, vol. xxxvi, p. 906.

cal value in certain cases. Wilms,¹ from the surgical clinic in Basel, has employed it. He warns that the extension may be too great. Steinmann states that in his opinion one need use less weight than with extension by means of adhesive plaster, and now that he has adopted Zuppinger's semiflexion position, the weights can be reduced still farther. Steinmann makes a remark very similar to the one made by Lane in this country. He says the *x*-ray and medicolegal procedures are demonstrating that our results from the treatment of fractures are not as good as they should be.

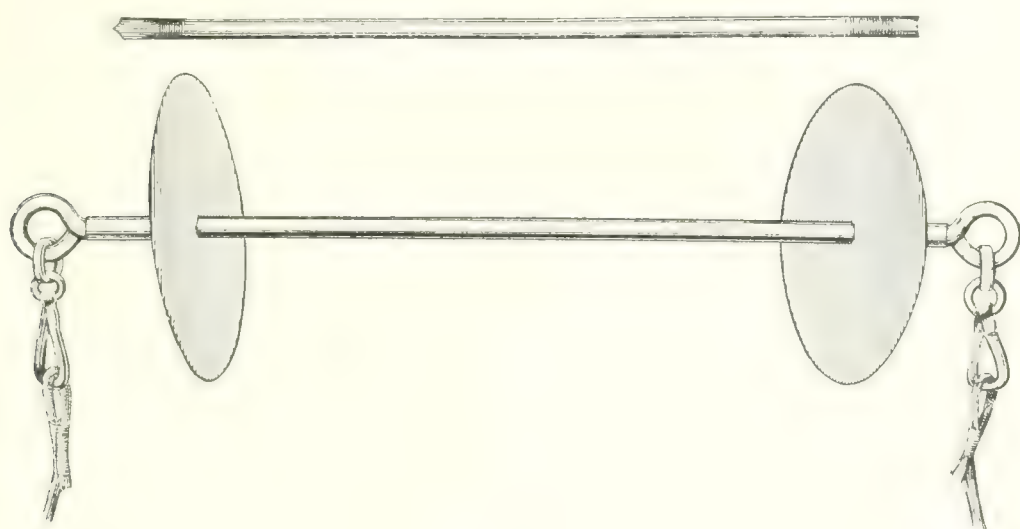


FIG. 15

Just as I have dictated the above the most recent communication by Steinmann² has appeared. He again reviews the experience of Wilms, Becker, Anschütz, and others, and especially mentions the results in the hands of general practitioners who have used ordinary nails. These nails have been used in the os calcis for fractures of the malleoli, in the malleoli, or through the tibia for fractures of the leg, in the condyles of the femur for fractures of the shaft and neck; they have been employed in the extension treatment for fractures of the humerus, and Wilms has used it in congenital dislocation of the hip, to pull the head of the bone into the acetabulum.

Tear Fractures of the Epicondyle of the Inner Condyle of the Femur. Stieda³ calls attention to the presence of a small bone shadow on the tibial side of the internal condyle, in the routine study of *x*-ray pictures of cases of injury and contusion of the knee-joint.

In studying the condition anatomically, he was of the opinion that this bone shadow was due to a separation of the upper portion of the epicondyle (epicondylus medialis). It was rather interesting that in his

¹ Deutsche Zeitschrift f. Chirurgie, 1908, vol. xcii, p. 260.

² Archiv f. klinische Chirurgie, 1909, vol. lxxxix, p. 1130.

³ Ibid., vol. lxxxv, p. 815.

examination of anatomical specimens he encountered an example of a typical fracture of this kind. He gives his cases in detail. Clinically, there is local tenderness and now and then a little ecchymosis; there is never any impairment of joint function; the tenderness may persist for some time, and in the tender area a small nodule may be palpated now and then. It is a condition to be on the lookout for in studying *x*-rays of injured knee-joints. In one case the little fragment was the cause of a purulent periostitis. I have just observed a small tear fracture of the os calcis in which later there was an infection, and I found the fragment in a small abscess cavity adherent to the tendo Achillis.

Vogel,¹ who gives Stieda credit for first describing this typical injury, reports his cases and agrees with Stieda. He is of the opinion, with Stieda, that the fracture is due to direct force and not to muscle pull. The adductor magnus may pull up the fragment after its separation, but it is hard to imagine that this muscle, or the gastrocnemius, both of which have other attachments, are capable of pulling off this epicondyle alone. Vogel has operated on one case and has studied the anatomical conditions, while Stieda has only observed it on the cadaver. The operation is a simple one, and as the joint capsule is attached to the lower portion of the epicondyle it is not necessary to enter the joint in removing the fragment of the upper portion, but Vogel has observed healing of the fragment in position in the *x*-rays, and he has no convincing evidence to offer in favor of immediate operation. He is of the opinion that the danger of osteophyte formation may be less. Vogel also observed some joint swelling and restriction of motion in his cases, but as Stieda remarks, these symptoms may have been due to some incidental injury to the internal apparatus of the joint which would not be portrayed in the *x*-rays.

Fractures of Both Condyles of the Femur. Meissner,² from von Bruns' clinic, makes the best contribution on this fracture since the introduction of the *x*-rays. It is a rare fracture, and in studying the 26 cases observed in his clinic, he reproduces the *x*-rays of the 5 cases observed in the last five years. This contribution has a most modern note; it ends with the remark that the results have been most unsatisfactory; there were 6 deaths, all in compound fractures, and among the 20 cases remaining only 6 good results. He is of the opinion that extension in the semiflexed position, as recommended by Zuppinger-Henschen,³ promises better results than the older treatment. Bardenheuer prefers traction in the extended position, and claims results just as good as Zuppinger's. Lane advocates immediate operation.

¹ Archiv f. klinische Chirurgie, 1908, vol. lxxxvii, p. 1076.

² Beitrage zur klinischen Chirurgie, 1908, vol. lviii, p. 216.

³ Loc. cit.

The point that I wish to emphasize is that better results should be obtained in this "T" or "Y" fracture of the lower end of the femur. It is a joint fracture in the sense that there is, accompanying it, an arthritis with an effusion, often hemorrhagic. As in all joint fractures, perfect reduction of the fragments is essential. In my opinion one should first take an *x*-ray of such an injury, then reduce under ether with extension in semiflexed position; in this position the knee-joint should have massage and hot applications; between the fifth and tenth day another *x*-ray should be taken; if the fragments are in good position the treatment should be continued with daily massage and hot applications; passive motion of the knee-joint should begin at the end of the third week; if the fragments are not in perfect apposition, operate, fix in position, and employ the same after-treatment. In compound fractures the nailing of the tibia for the purposes of extension, I am of the opinion, would be a very valuable procedure, and perhaps later experience will demonstrate that this method of extension is better than with adhesive straps.

Fracture of the Patella. The old fractures with separation are the most difficult to treat. Rotter¹ describes what he calls a new method. In his case the separation between the bone fragments was 7 cm. After exposing the fragments of the patella and approximating them with silver-wire suture as far as he could, leaving 2 cm. separation, he made a flap of the quadriceps femoris fascia; this flap was 3 cm. wide and 7 cm. long; the base of the flap was just above the upper fragment; the flap was turned over, sutured to the fascia around the fragment and to the patellar ligament below the lower fragment; the lateral tear in the capsule was also sutured. This method, according to Eisendrath,² is very much like a method described by Perraresi. Von Bergmann got the fragments together by chiselling the patellar ligament and its tubercle and reattaching it higher up on the tibia. Sonnenburg and others say that this is often not feasible. Schanze transplants the sartorius muscle.

In my own experience the method taught me by Halsted has always proved successful. This has been a plastic lengthening of the rectus muscle, which method has been described in *PROGRESSIVE MEDICINE* before. The separation of the fragments in my case was much greater than in Rotter's case. The patient was recently examined by me; he has perfect function, and the left patella, the seat of the old fracture, is firmly united, like the right, which had a recent fracture. In this case I found that by making a transverse incision about 5 cm. above the upper fragment through the rectus femoris and impinging on both sides into the medialis and externus muscles, I could bring down the upper fragment and fix it to the lower without tension. The horizontal

¹ *Centralblatt f. Chirurgie*, 1908, vol. xxxv, p. 541.

² *Keen's Surgery*, 1907, vol. ii, p. 256.

defect, on extension, became diamond-shaped. I could approximate the upper and lower "V" of the diamond, but a cavity about the size of a silver dollar remained. This undoubtedly filled with granulation tissue. Halsted, in his cases, made a series of lateral horizontal incisions, but I succeeded with one incision which passed through everything to accomplish the same amount of lengthening.

In the *British Medical Journal*, April, 1908, there is a very interesting letter written by Lord Lister, in 1895, in which he describes his method of treating old fractures of the patella. He had two cases. The operation was done in two stages. First he brought the fragments as closely together as possible through an open incision, with the limb extended

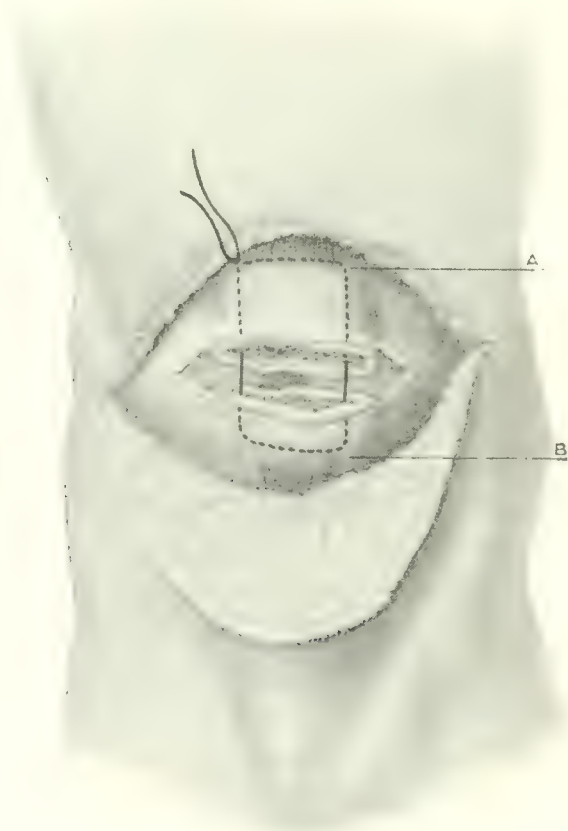


FIG. 16

at right angles to the body, and this position was maintained for some time after operation. Later, a second operation was done, and Lister found that now he could completely approximate the fragments. I must confess that this method in two stages does not appeal to me as well as the operation in one stage.

Hoffman,¹ from Payr's clinic in Greifswald, describes the technique of the suture employed by them, and at the same time gives a very interesting and thorough review of practically all the methods of subcutaneous and open suture. The point that he makes in his suture (Fig. 16) is

¹ Deutsche Zeitschrift f. Chirurgie, 1908, vol. xci, p. 623.

that the silver wire is made to pass through the fractured surfaces (not through the joint) and out through the patellar ligament below and the quadriceps above. When this is tied it not only approximates bone, but the pull on the wires comes on ligament tissue and not bone. Hoffmann is of the opinion that there is less give.

Corner¹ gives a very interesting review of 504 cases of fracture of the patella observed in St. Thomas' Hospital in London. He reflects most correctly the modern view, that operation is indicated in all cases in which the bone fragments are separated; in comminuted fractures with little or no tear of the ligaments and no separation, operation is not necessary; the lower half of the patella is involved in the fracture four times as frequently as the upper half. Refracture usually takes place within the first year; the most dangerous period is the first three months. He is of the opinion that any suture, metal or silk, can be used, but warns against catgut. He advises early massage. He is of the opinion that connective-tissue union with a fine line gives as good a result as bony union.

As I have stated before in *PROGRESSIVE MEDICINE*, the treatment of fracture of the patella is pretty well settled. In recent cases there should be no difficulty in getting a perfect result. The majority of surgeons advise against immediate operation—within twenty-four to forty-eight hours. The reasons for delay are good; it allows for passive motion, massage, to get rid of the exudate following the traumatism; the fresh torn surfaces of the bone and ligaments will have more protective power than immediately after the injury. Murphy employs preliminary subcutaneous injections of formalin, because he is of the opinion that these increase the local protection against infection. In my experience this has been unnecessary, but I always wait from five to ten days. Five days is usually long enough. I have never seen any harm from a horizontal position. In recent cases the fragments can be well approximated by a suture of the torn tendon only. There is no necessity for suture through the bone. Halsted has employed this method since 1889. The lateral tear in the ligament should always be sutured, and for this I employ catgut; silk would be just as good. In older cases the bone must be approximated by a metal suture as pictured by Hoffmann (Fig. 16). In addition, there should be suture of the torn capsule. When the fragments cannot be approximated without tension, I prefer the lengthening of the quadriceps femoris muscle as described. Although Kausch and Payr put their fractures up in flexion, I have not, in my own cases, seen any necessity for this.

Tear of the Patellar Tendon. Painter² describes three cases—two fresh and one two months old. They are difficult at first sight to differentiate from fracture of the patella. Immediate operation is indicated. Painter

¹ Practitioner, October, 1908.

² Boston Medical and Surgical Journal, June 18, 1908.

used silk for suture and drilled holes in the tibia and in the patella, through which the silk was passed. These are interesting cases.

In fracture of the patella, the patellar ligament, and complete tear of the quadriceps tendon there is a common symptom—inability to extend the leg on the knee. If there is much swelling there may be difficulty at first to make a differential diagnosis. This inability to extend the knee is of itself an indication for operation. Such cases should be placed in bed, given massage and passive motion; at the end of a few days, as the swelling subsides, one will be able to determine the exact position of the injury, but each day the patient should be tested as to his ability to extend the leg. In two cases which I have observed, of partial tear of the ligament of the quadriceps femoris muscle, the ability to fully extend the leg was preserved, and during the patient's attempt at extension I could feel with the finger the defect due to the tear of the tendon. As the tear was incomplete, the patients were treated with the leg extended in adhesive straps. The ultimate result is perfect. Tear of the patellar ligament must be differentiated from fracture of the beak-shaped process; in the latter, ability to fully extend is not lost.

Injuries of the Semilunar Cartilages of the Knee. Last year¹ I reviewed the communication of the great authority, Koenig. Recently Dambrin,² in reporting a case of his own, goes over the entire subject anatomically, pathologically, and from the standpoint of diagnosis and treatment. He collects 121 cases from the literature in which the partial or complete luxation of the meniscus has been subjected to treatment by operation, at which the meniscus has either been removed or sutured. There is nothing new in this review. Every point brought out by this study of a large number of cases confirms the conclusions discussed here from a smaller group of cases. Dambrin's case is interesting, because the operation was performed at once. His patient in rising suddenly from a sitting position felt an intense pain in the knee, and there was inability to fully extend. This symptom we have just discussed in relation to fractures of the patella and tear of the ligament. In Dambrin's case the luxation was not complete, and he obtained a good immediate and ultimate result from suture. In the majority of cases, operation has been performed later, but cases clinically like Dambrin's have recovered without operation if the meniscus could be reduced and the knee protected with adhesive straps during healing. In the majority of cases operated upon excision has been performed. The inner or medial meniscus is usually involved; the tear in the majority of cases is anteriorly, less frequent laterally, and very rare posteriorly. A double parallel longitudinal tear reported by Dawies-Colley is unique. Meniscitis traumatica, described by Roux, cannot always be differentiated. This recovers from conservative treatment and massage.

¹ PROGRESSIVE MEDICINE, December, 1908, p. 174.

² *Revue de Chirurgie*, 1907, vol. xxxv, pp. 426 and 616.

I am inclined to the opinion that after an injury to the knee-joint, if one can exclude the injuries for which, experience has demonstrated, the best results are obtained by immediate operation, it is best to act conservatively until definite symptoms indicate operative intervention. The general practitioner can save a great deal of surgery by the proper treatment of joint injuries in the recent state. The principles of this treatment are support in adhesive straps combined with passive motion and massage.

Dislocation of the Knee. All forms of dislocation of this joint are comparatively infrequent—the congenital, the acquired, the habitual and the voluntary. According to Joachimsthal,¹ there has been but one other case described in the literature. This one, reported by Julius Wolff, differs from Joachimsthal's observation in that the voluntary dislocation of the knee was one of many other dislocations. The patient was a girl, aged nine years; both hips and the left knee were congenitally dislocated; the two elbows had habitual dislocations, and the right knee could also be voluntarily dislocated. Joachimsthal says we must distinguish between habitual and voluntary dislocation. In the voluntary the patient is able to produce the dislocation and reduce it at will, but in the habitual dislocation the luxation takes place outside of voluntary control.

In the patient observed by Joachimsthal but one joint—the right knee—was involved in an otherwise healthy individual. This case also illustrates the point that I have just made, that treatment in the recent state of injury to joints, especially the knee, when properly carried out, will prevent many of the secondary lesions. This patient of Joachimsthal had a contusion of the knee followed by traumatic arthritis with effusion. Undoubtedly the effusion was so great that the joint ligament and the capsule were distended (aspiration should have been performed). The patient suffered with recurrent attacks with effusion and then with a dislocation which he could reduce; then he found out he could dislocate and reduce the knee himself. In the dislocation the tibia went forward and the femur backward. This is illustrated by Joachimsthal in a photograph of the patient and in an *x*-ray. Joachimsthal calls attention to the literature of voluntary dislocation of other joints and also questions whether many of the so-called voluntary dislocations of the hip may not be the so-called "snapping hip" as recently described by zur Verth.²

One interested in dislocations of the knee will find the following references of service; with their bibliographies one need not look farther: Reiner,³ Magnus,⁴ Ruppaner.⁵

¹ Zeitschrift f. orthopädische Chirurgie, 1909, vol. xxiii, p. 498.

² Deutsche Zeitschrift f. Chirurgie, 1909, vol. xeviii, p. 47.

³ Zeitschrift f. orthopädische Chirurgie, 1904, vol. xiii, p. 442.

⁴ Deutsche Zeitschrift f. Chirurgie, 1905, vol. lxxviii, p. 555.

⁵ Ibid., 1906, vol. lxxxiii, p. 554.

Fractures of the Upper End of the Tibia. The most interesting fracture in this region is one confined to the beak-shaped process or the *tubercle apophysis* of the tibia. The literature will be found fully discussed in *PROGRESSIVE MEDICINE* for December, 1903, 1905, 1906, and 1907. Although the condition was first described by Key in the *Lancet*, in 1827, the Germans speak of it as Schlatter's fracture, because, in 1903, he was the first to call particular attention to it. His last contribution appears in 1908.¹ Since my review, in 1907, there have been interesting contributions by Kirchner² and Joachimsthal.³ We must look, however, upon Alsberg's communication⁴ as the most recent. He not only gives references to all the more important literature, even discussing Schlatter's most recent article, but he questions whether the condition can be looked upon in every instance as a true fracture. Alsberg concludes that this painful swelling of the apophysis is a distinct disease of adolescent age, almost without exception in boys between the ages of twelve and fourteen; the right side is more often affected than the left; the disease is frequently bilateral. In the cases subjected to operation and in the *x*-rays there is great irregularity in the anatomical findings. Alsberg is of the opinion that operative interference hastens the healing and will aid in the further study of this condition.

The cases which I have observed have all fully recovered without operation. My most recent case was in a priest, aged thirty-five years; no trauma except that which could be attributed to his devotions. It is now one year since I first observed him; the swelling has remained unchanged, the tenderness has disappeared. Relief was given this patient by instructing him how to use a rubber ring to kneel on. I am of the opinion that if he would submit to operation, he would be able to kneel in comfort without the rubber ring.

Fractures at the Lower End of the Tibia. Fractures about the ankle have not been considered here since the issue of *PROGRESSIVE MEDICINE*, December, 1906, p. 198. Meissner⁵ describes what he calls a typical fracture of the tibia in the talocrural joint (ankle-joint). His case is illustrated with some excellent *x*-rays showing a fracture which I have discussed before.

The conclusions in regard to treatment illustrate very emphatically the great principles in the treatment of fracture: Early treatment and reduction under anesthesia in the recent state. In some of the cases, as previously shown by Pels-Leusden,⁶ there is very little dislocation of the triangular fragment of the tibia articulating with the astragalus.

¹ Beiträge zur klinischen Chirurgie, 1908, vol. lix, p. 518.

² Archiv f. klinische Chirurgie, 1907, vol. lxxxiv, p. 898.

³ Deutsche Zeitschrift f. Chirurgie, 1907, vol. lxxxvi, p. 493.

⁴ Zeitschrift f. orthopädische Chirurgie, 1908, vol. xx, p. 302.

⁵ Beiträge zur klinischen Chirurgie, 1908, vol. lxi, p. 136.

⁶ *PROGRESSIVE MEDICINE*, December, 1908, p. 194.

Here reduction is easily accomplished, as well as retention. In other cases, as brought out by Meissner, there is dislocation not only of the fragment of the tibia, but of the foot; as a rule, the astragalus is dislocated posteriorly with the fragment, while the tibia goes forward. Reduction here is not only more difficult, but also retention. In these cases it is better to do a tenotomy of the tendo Achillis; very rarely in the recent state will it be necessary to resort to further operative intervention, but if reduction is not made early, later it becomes very difficult. Operation is usually necessary, and in some cases it may be necessary to excise the astragalus. If the dislocation is not reduced immediately there is the possibility of gangrene of the foot as illustrated by one of Meissner's cases.

Meissner,¹ from von Bruns' clinic in Tübingen, presents and illustrates fractures of the malleoli of the tibia and fibula better than in any communication I have yet studied. There are thirty-eight illustrations, all but two of which are tracings of *x*-rays; these two are photographs of an anatomical specimen. Here, again, we find evidence that if fractures are seen early and are properly reduced, good results can be obtained without operative intervention. In the simple cases there was one death from fat emboli. In a few cases, in which dislocation was very marked, tenotomy of the tendo Achillis was necessary; otherwise in these simple fractures treated in the recent stage good results were obtained. This has been my experience in malleolar and supramalleolar fractures. Massage and passive motion are important adjuncts. In the typical Pott's fracture the foot should be placed in a slightly overcorrected position.

In the compound fractures, especially those through the malleoli involving the ankle-joint, the results were very bad, except in the cases admitted directly to the clinic. In six such cases there was but one resection. In the cases admitted late and infected there were three deaths, two from sepsis and one from embolism; six resections and eleven amputations. Here we have an illustration that Lister's principles of the treatment of compound fractures are not properly understood by the general profession. In the compound supramalleolar fracture the ankle-joint is not opened, so the results were better.

I am sorry I have not space to go into further details. An Italian surgeon, Anzilotti,² in his paper before the Italian Orthopedic Congress in 1908, rather favored operation in malleolar fractures. He reported three cases. His colleague, Galeazzi, could not agree with him.

Feiss³ reports on the operative treatment of fractures, with deformity of the lower epiphysis of the tibia. His illustrations are very clear. He performs an osteotomy of both tibia and fibula, with excellent

¹ Beiträge zur klinischen Chirurgie, 1908, vol. lxii, p. 78.

² Zeitschrift f. orthopädische Chirurgie, 1909, vol. xxiii, p. 277.

³ Surgery, Gynecology, and Obstetrics, 1909, vol. viii, p. 583.

results, as shown in the illustrations. Heath and Selby,¹ from St. Vincent Hospital, in Toledo, report their experience with the open treatment of Pott's fracture. I do not believe, however, that they have demonstrated that operation is necessary in the recent state. The bad results they speak of from conservative treatment are due to the fact that the fracture was not reduced. In the recent state this reduction can be accomplished, according to the experience of the surgical world, in the vast majority of cases without open incision.

Fractures of the Os Calcis. In *PROGRESSIVE MEDICINE*, December, 1906, p. 195, I presented a discussion of the monograph of Voeckler and Mertens on compression fractures. The most interesting literature since then concerns itself with the explanation of certain spurs or projections, exostoses from the os calcis. The entire literature of the subject is brought up to date by Chrysospathes,² an orthopedic surgeon in Athens. His first communication in 1907³ concludes with the opinion that the spur is an anomaly due to traction of ligament and tendon, and springs from the epiphyseal line; it is not a fracture, and he does not agree with Haglund,⁴ who favors the view that it arises from the body and not from the epiphysis. Chrysospathes rather questions that these exostoses are ever of gonorrheal origin. One must be on the lookout for it in studying x-rays. Irrespective of the exact etiology of its origin, it may be the cause of very painful feet, and an operation is in some instances the only means for relief.

These three communications just referred to present a complete anatomical study of the subject. I shall not enter the controversy, but I am glad to be able to call attention to these interesting findings. I have just observed this spur in a case of compression fracture of the os calcis and astragalus. There was a second spur from the os calcis on the outer lateral surface at the border of the talocalcaneus joint. The patient was incapacitated for work on account of pain and tenderness. It is too early to judge of the result of the removal of these spurs or exostoses.

In this country Cotton and Wilson⁵ present an excellent study of 100 cases of fracture of the os calcis observed in the City Hospital in Boston. They call attention to the long period of disability and the bad results in this fracture in cases in which the fragments are not reduced in the recent state. If this cannot be done by manipulation under ether, they resort to exposure of the fragments by excision, reduction by different manipulations, and retention by suture or nail. Under this treatment one should expect good results. They begin passive and active motion with massage at the end of the second week, but do not

¹ *Annals of Surgery*, 1908, vol. xlvii, p. 98.

² *Zeitschrift f. orthopädische Chirurgie*, 1909, vol. xxiii, p. 377.

³ *Ibid.*, vol. xviii, p. 365.

⁴ *Ibid.*, vol. xix, p. 457.

⁵ *Boston Medical and Surgical Journal*, October 29, 1908.

allow the patient to bear weight for a month. For the old fractures which seek help on account of pain and deformity, they obtain a certain amount of relief by a flat-foot brace, in others by osteotomy. This communication reiterates what every careful study of any single fracture will do. The results can be improved; there is no necessity for the great amount of surgery done at the present time to correct mistakes of chiefly omission in the recent state of fractures.

Among the attempts at maintaining the arch of the foot in fractures of the tarsus, especially in fractures of the os calcis, is the apparatus or splint by Müller,¹ from the clinic of König, in Altona. From the studies of Voeckler, Mertens, Cotton, and Wilson, and from my own experience, such an apparatus is not necessary. One should reduce by manipulation or open incision, fix for a week or ten days in plaster, and then institute passive motion and massage.

Fracture of the Astragalus. In PROGRESSIVE MEDICINE, December, 1906, I called attention to the monograph of Dietz, which brought the subject up to 1904, and to the brief communications of Couteaud and Thienaus in which the dislocated fragment had been removed. Quite recently Stealy² has collected practically all the literature and reviews, 122 examples of isolated fracture of the astragalus and 68 in which the fracture was associated with other fractures in the neighborhood. Removal of the fragment or the entire astragalus was performed in 50 cases; amputation in 8 cases. Death from septicemia in compound fracture was very frequent; necrosis of the unreduced dislocated fragment was not infrequent in the simple fractures. The French surgeons, Olliver and Loison, were the first to establish the feasibility of the removal of part of, or the entire, astragalus. Stealy then reports in detail his two cases, and concludes that one must always take an *x*-ray, and that there is only one of two things to do if there is any dislocation of the fragments, namely, reduce or extirpate. If the compound fracture is seen in the recent state, after cleansing along established lines, one can treat the fracture as a simple one; but if there has been a long interval—twelve hours or more—or any signs of infection, it will be safer to remove the fragments or the entire astragalus, as this allows better drainage. It has been demonstrated that partial or complete removal of the astragalus results in a slightly shortened limb with good function.

Ebbinghaus³ describes a typical fracture of Stieda's process of the astragalus. This process, if one will glance at an anatomy, is called the posterior process of the astragalus. It is a typical posterior fracture, and takes place with the foot in extreme extension (equinus), usually when the patient is walking down an inclined plane, or jumps down upon one.

¹ Deutsche Zeitschrift f. Chirurgie, 1908, vol. xvi, p. 313.

² Surgery, Gynecology, and Obstetrics, January, 1909, vol. viii, p. 36.

Zeitschrift f. orthopädische Chirurgie, 1908, vol. xx, p. 251.

Then the tibia comes in contact with this process and practically forces it off. The symptoms are very much like those in fracture of the internal malleolus, but in the isolated fracture of Stieda's process the foot is held in a greater degree of equinus, and the tenderness is between the internal malleolus and the tendo Achillis. In some instances crepitus can be made out here. There is no local tenderness over the internal malleolus. The only important point in treatment is to overcome the tendency to equinus by keeping the foot straight or a little flexed. The prognosis is good.

Fracture of the Tarsal Scaphoid. Hoffmann's¹ communication may be looked upon as the most recent and most complete in German, and that presented by Philip H. Cook,² of Worcester, Mass., in English. Hoffmann has been able to collect some 22 cases, all of which were not, however, isolated fractures. I cannot go into the discussion of the etiology and mechanism, but can only present the most practical side. This fracture will be overlooked and diagnosed a sprain if an *x*-ray is not taken. If there is much dislocation of the fragments or much compression, the patient will have more or less loss of function. When the fracture is recognized in the recent state, I am of the opinion that a good result should be obtained in every case. If the fragments cannot be reduced, they should be exposed by open incision. In older cases, according to Hoffmann, a few are relieved by a flat-foot plate; in others, operation is indicated. In some cases, after exposing the scaphoid, the cancellous central bone can be curetted, leaving the cartilage, articular surface, and the outer table. This shell can be moulded into place and later fills up with bone, giving a good result. In some instances it may be necessary to excise the entire scaphoid where articular changes have taken place. In the fresh after reduction of the fragments (confirmed by an *x*-ray) the foot should be fixed in plaster in a slightly varus position, and this plaster should be kept up three or four weeks. The entire weight of the body should not be permitted to fall on the foot for two months. A temporary plate for the arch, I believe, would be an additional precaution, because the most common result in this fracture is flat foot. In Cook's first case, on account of the comminution of the scaphoid, he is of the opinion that a better result would have been obtained from an operation. The *x*-ray shows that the fragments are not in place. It is not stated whether this was taken before or after reduction. In his second case an *x*-ray taken some months after treatment showed that reduction had not been complete, and this patient was relieved by a flat-foot plate. This case, among others, impresses me with the conclusion that the plate should have been applied before the patient was allowed to walk. The patient

¹ Beiträge zur klinischen Chirurgie, 1908, vol. lix, p. 217.

² Annals of Surgery, October, 1907, vol. xlv, p. 633.

in this case was allowed to walk in four weeks; there was a distinct forward displacement of the fragments.

This fracture of the tarsal scaphoid demonstrates the importance of not only accurate knowledge of the anatomy of the foot, but also attention to small details in the after-treatment.

Landwehr¹ reports a case in which the central portion had to be curetted; this I have already discussed, as it was mentioned in Hoffa's paper. Both Hoffmann and Landwehr emphasize the importance of remembering that there may be considerable differences in the *x*-ray shadows of the tarsal bones in different individuals and in the feet of the same individual. There may be sesamoid bones, and sometimes the tubercles, for example, the tubercle of the scaphoid, may remain as a separate bone.

There is a communication, fully illustrated, by Gaugele,² on the causal relations of the os tibiale and fractures of the scaphoid to pes valgus. I am sorry lack of space prevents the reproduction of some of his illustrations.

I find that I have overlooked the monograph of Finsterer,³ which is a more extensive report than Hoffmann's, and considers also injuries of the tarsus other than those of the scaphoid. These communications should be carefully studied by all men who are doing special orthopedic work. I am inclined to think that if these injuries are studied with the *x*-ray in the recent state and properly treated, there will be very much less of the orthopedic work in the chronic state. I am surprised, however, at the great number of these cases that still seek advice. Some of them have been diagnosticated sprain, but not a few, while correctly diagnosticated, have been incorrectly treated.

Fracture of the Clavicle. If we are to conclude that few contributions indicate satisfactory results, one can say in regard to fractures or dislocations of the clavicle that the majority of surgeons are satisfied. Klapp⁴ brings out a new point. He states that if one flexes the forearm on the arm to a right angle, lets the arm rest against the side of the body, and then rotates the arm with the forearm outward, marked extension is obtained on the outer third of the clavicle, and that this will reduce the dislocation. Having accomplished this, the position is maintained by adhesive straps.

Fracture of the Scapula. Orlando H. Petty⁵ reports a case of isolated fracture of the coracoid process in which the diagnosis was confirmed by the *x*-rays. It is a very rare fracture, and he reviews what he has been able to find on this subject in the literature. It is the first case that

¹ Zeitschrift f. orthopädische Chirurgie, 1908, vol. xix, p. 445.

² Ibid., vol. xix, p. 494.

³ Beiträge zur klinischen Chirurgie, 1908, vol. lix, p. 99.

⁴ Centralblatt f. Chirurgie, 1908, vol. xxxv, Supplement No. 35, p. 152.

⁵ Annals of Surgery, March, 1907, vol. xlv, p. 427.

I have seen confirmed by the *x*-rays. The patient had used great muscular exertion in trying to force a drunken man off his car; he observed severe pain in the right shoulder, and was unable to raise the arm to ring up fares. At the examination the patient was unable to raise the right arm; he could elevate the shoulder and throw it backward, but he could not move the shoulder forward. There was no loss of function of the forearm or hand; there was definite local pain and tenderness over the coracoid process. Six weeks after the injury he was still unable to raise the arm high above the head, although union seemed solid. Dr. Petty writes me that after more or less functional disability, lasting eleven months, his patient, on recent examination, shows perfectly normal conditions.

Habitual Dislocation of the Shoulder. Although these cases are rare, one should know that cures have been accomplished by operative treatment. The entire subject has been brought up to a recent date by Clairmont and Ehrlich¹ from the clinic of von Eiselsberg. They accept much of the conclusions of Perthes,² but advocate a new method of operation by muscle plasty, which is fully illustrated. Before subjecting a case of habitual dislocation of the shoulder to treatment, this communication of Clairmont and Ehrlich should be read in detail, but before accepting their muscle plasty, one should consider the position of Wilmanns,³ who, from a careful study of the operative cases, concludes that the most conservative and simplest operative procedure should be employed, that is, opening of the capsule and some suture which reduces the space within the capsule. Perthes recognizes three etiological factors—a tear of the muscles attached to the major tubercle, a tear and chipping off of the inner border of the glenoid, and, third, dilatation of the capsule. In one of Perthes' cases he reunited the torn muscles to the major tubercle by nailing, and Hildebrand curetted the glenoidal cavity. Wilmanns is of the opinion that such operations are unnecessary. I must agree with Wilmanns that excision of the head of the humerus, first performed many years ago by Hueter and later denounced by Bardenheuer, and the arthrodesis advocated by Albert should not be employed. Nor do I like Hildebrand's curetting of the glenoidal cavity, but the refixation of the torn muscles advocated and performed by Perthes and this muscle plasty of Clairmont and Ehrlich may, in some cases, be demanded in addition to correcting the dilatation of the capsule.

CONGENITAL DISLOCATION OF THE SHOULDER. In *PROGRESSIVE MEDICINE*, December, 1906, I introduced this subject, with a brief review of Whitman's communication. Since then the literature has

¹ *Archiv f. klinische Chirurgie*, 1909, vol. lxxxix, p. 798.

² *Deutsche Zeitschrift f. Chirurgie*, 1906, vol. lxxxv, p. 199.

³ *Centralblatt f. Chirurgie*, 1909, vol. xxxvi, p. 429.

been scanty. Von Bramann¹ brings out a new and important point. His two cases were about fourteen years of age, and the most marked feature was the extreme inward rotation of the entire upper extremity. On account of anatomical changes, reduction of the head of the bone was impossible. For this reason he performed an osteotomy on the humerus below the insertion of the deltoid and rotated the arm out. Healing in this position gave the patient much added use of the arm. In both of his cases the dislocation was posterior. Of course, in such cases, if the dislocation had been recognized at an earlier age, reduction might have been possible.

Zander² describes his observation briefly, but very clearly. The patient was a girl, aged thirteen years, and in addition to the posterior dislocation of the shoulder there was elevation of the scapula. That the condition was congenital, Zander claims, is proved by this elevation of the scapula and the absence of the glenoid cavity in the normal position. Therefore, in a case like this, one would have to make a new acetabular cavity.

As the deformities—abduction and internal rotation—were less than in von Bramann's case, and as there was fair function, Zander did not consider the risk of an operation justifiable.

TRAUMATIC DISLOCATION OF THE SHOULDER. The most interesting contribution is a study by Schulz³ on the ultimate results of 160 cases in the Breslau surgical clinic observed in five years. This impresses one with the frequency of this injury. Schulz was very careful to exclude all complicated dislocations. He wished to estimate the definite result in simple uncomplicated dislocations which were treated in their clinic. After exclusions he was able to trace 54 pure dislocations. Of these, 46 were reduced in the recent state in the clinic, and 8 cases had been reduced outside and sent in for treatment. In the great majority of cases Kocher's method was employed for reduction.

So far as I know this is the most complete and, in fact the only, careful study of ultimate results of a large number of cases of dislocation of the shoulder. The most important conclusions are as follows: Differing from Bardenheuer, this dislocation is not often complicated by fracture; as in the habitual dislocation, if there is an injury of the bone, it is situated either in the greater tuberosity or the glenoid cavity; the prognosis, as far as a perfect result, is not good; in only 7, or 13 per cent., of these 54 cases can the result be considered absolutely perfect; in 14 cases, or 26 per cent., motion was good, but strength was reduced to one-half, in a few cases even more; pain in the shoulder, especially during change of weather, was complained of in at least one-third of

¹ *Archiv f. klinische Chirurgie*, 1906, vol. lxxxi, Part ii, p. 351.

² *Zeitschrift f. orthopädische*, 1908, vol. xx, p. 237.

³ *Beiträge zur klinischen Chirurgie*, 1908, vol. lx, p. 333.

the cases; in the remaining 33 cases there was more or less restriction of motion. There was not an example of ankylosis, and, very interesting to note, not a case of habitual dislocation.

These cases received very good treatment, and Schulz, after a most exhaustive investigation, was unable to find a cause which would answer for all cases. He is not of the opinion that Bardenheuer's extension treatment will give better results. Theoretically, passive motion should be begun early, but if performed too early and energetically, the tear of the capsule may not heal and habitual dislocation may follow. After reduction there should be rest for a few days, then passive motion and massage; the passive motion should at first be very gentle; after ten days passive and active motion should be increased; if the exercises are carried out by the patient carefully, the chances of a good result are increased. It is very important that the prevailing opinion, that perfect results should be obtained if a shoulder dislocation is reduced in the recent state, be modified.

The other communications by Ellerbroek,¹ who reviews all of the dislocations in the Göttingen clinic for seven years, and Bach² I will not review here. In American literature there are two very thorough papers with the literature by Raymond Russ,³ of the University of California, and Frank Vale,⁴ of Washington.

Abduction Treatment in Fractures of the Humerus. In *PROGRESSIVE MEDICINE*, December, 1902, I called attention to the two most important features of the treatment of fractures of the humerus, extension and abduction, and I illustrated Middeldorpf's triangle, to produce extension by abduction. In *PROGRESSIVE MEDICINE*, December, 1903, p. 124, I again emphasized this mode of treatment, and in Figs. 1 to 3 (Plate I) illustrated an observation of my own.



FIG. 17

The triangle devised by von Hacker in the surgical clinic in Gratz, and reported by Streissler,⁵ appeals to me as simpler than Middeldorpf's triangle and more comfortable. In the Middeldorpf triangle the hand is about the level of the hip, and makes walking awkward.⁶ The von Hacker triangle is made of pasteboard (Fig. 17); the bendings

¹ *Deutsche Zeitschrift f. Chirurgie*, 1908, vol. xcii, p. 453.

² *Ibid.*, 1906, vol. lxxxiii, p. 27.

³ *Surgery, Gynecology, and Obstetrics*, 1909, vol. viii, p. 168.

⁴ *Annals of Surgery*, 1908, vol. xlvii, p. 709.

⁵ *Beiträge zur klinischen Chirurgie*, 1907, vol. lv, p. 749.

⁶ See Fig. 14, *PROGRESSIVE MEDICINE*, December, 1902, p. 103.

are united with adhesive straps (Fig. 18); the position of the triangle is shown in Fig. 19. This triangle is held in place with bandages (Fig. 20). Streissler also describes and illustrates a method to allow extension in ambulatory treatment, which, however, seems complicated.

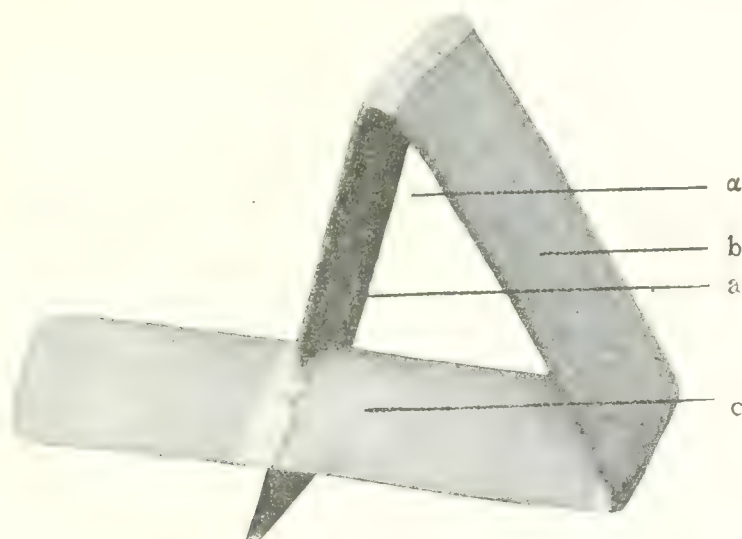


FIG. 18

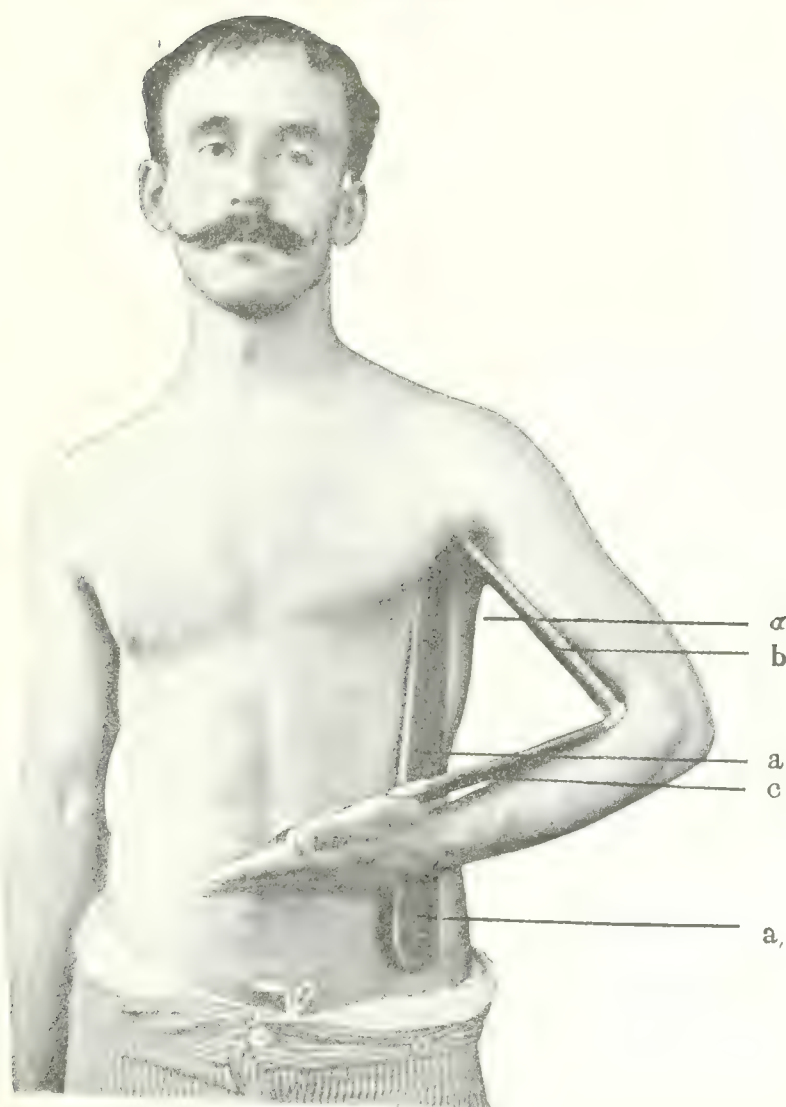


FIG. 19

Martini,¹ from the clinic of Anglesio, in Turin, describes a new apparatus in which the principle of extension for fractures of the humerus is maintained, but it is not as simple as von Hacker's triangle, or the method of extension which I illustrated in Fig. 13 of *PROGRESSIVE MEDICINE*, December, 1902, p. 103.

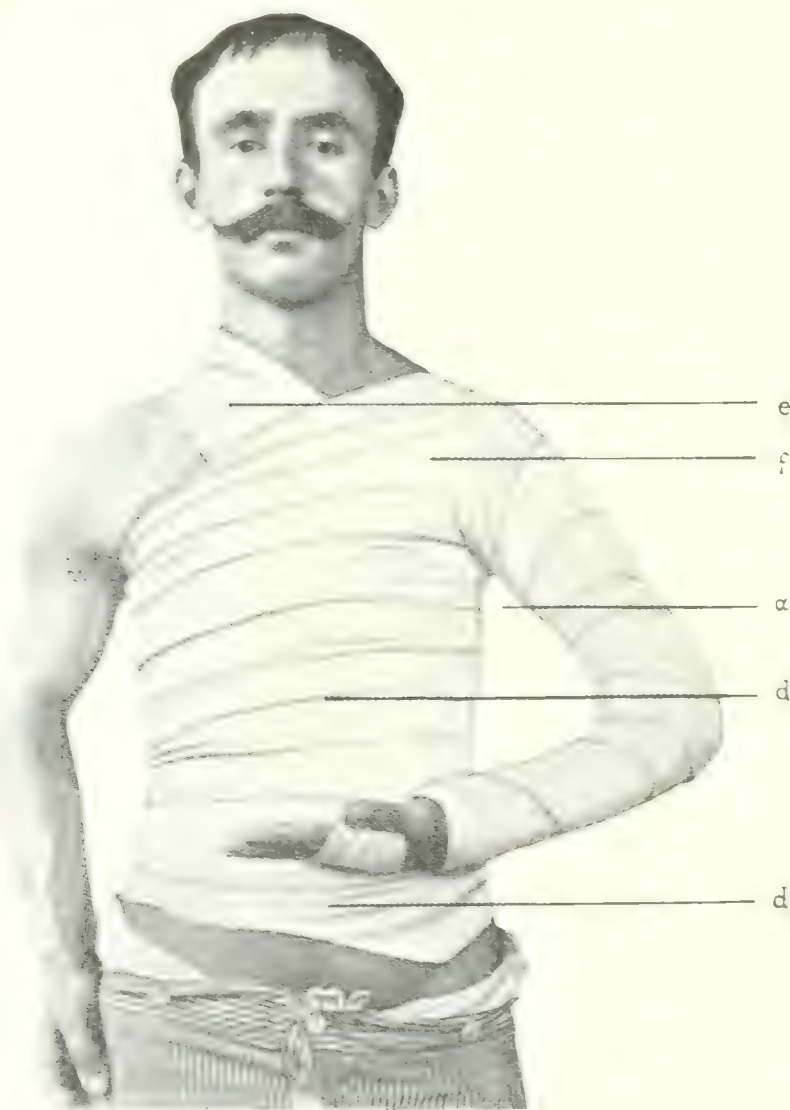


FIG. 20

Nerve Injuries in Fractures of the Upper Extremity. In *PROGRESSIVE MEDICINE*, December, 1905, p. 228, I introduced this subject with a discussion of Fessler's communication. There has been nothing especially new, but I should like to call attention to the unusually well illustrated report of Muehsam.² This surgeon reports the cases from Sonnenburg's clinic in the Moabit Hospital in Berlin, and gives detailed descriptions in each case.

¹ *Deutsche Zeitschrift f. Chirurgie*, 1908, vol. xciii, p 389.

² *Ibid.*, vol. xcv, p. 63.

TUMORS.

IN PROGRESSIVE MEDICINE, in my contributions to the December numbers since 1899, I have gradually introduced the subject of tumors until up to the present time all the possible neoplasms which may arise in the extremities have been considered. I have attempted to bring forward the most practical points in diagnosis and treatment and to demonstrate that it is worth while for a surgeon to study pathology for these practical purposes. In the treatment of all lesions in which there is a possibility of a malignant growth the first question, before any treatment, is diagnosis. In some lesions no operation is necessary, for others there must be local excision, and the extent of this local extirpation varies with the different diseases; in other instances there must be a dissection in continuity, if possible, of the local growth and the neighboring lymphatic glands. An illustration of such an extensive dissection I have shown in Fig. 23, p. 214, of PROGRESSIVE MEDICINE, December, 1908. This patient remains well seventeen months since operation.

Epithelial Tumors. In PROGRESSIVE MEDICINE, December, 1904, I covered the subject of epithelial tumors so thoroughly that there has been very little to add since then, except statistical studies as to the ultimate results in carcinoma of the extremities, rare tumors, and points in the differential diagnosis. For the purposes of study epithelial tumors are conveniently divided into *epithelial cysts* and *solid tumors*. In both of these we have the benign and malignant, in both, the epithelioma and the adenoma, and in both, tumors composed of the different cells which have been classified by Krompecher into three great groups—*epitheliomata basocellulare*, *spinocellulare*, and *cubocellulare*. The strictly benign solid or cystic epithelial tumor should be recognized, if not clinically, at least by its gross appearance, or from the study of a rapid frozen section. Local excision is enough. Also, for some forms of the early malignant solid and cystic epithelial tumors local extirpation is sufficient. This is a very important group which I wish to emphasize. To this group belong practically all of the basocellular tumors, but there are others in which it is not necessary to perform the lymphatic-gland operation.

I have frequently called attention to the fact that in carcinoma of the extremities, surgeons even of large experience and connected with the larger clinics have not performed the lymphatic-gland operation as a routine procedure. Tumors of the extremities, except primary bone tumors, are comparatively rare, and although the principles of differential diagnosis should be the same, to a certain extent, nevertheless, I find that there is a great deal of uncertainty. This, I am inclined to think, is due to the fact that no one surgeon sees many tumors of a like

character in the same situation, and an accumulated experience of this kind is a great help in differential diagnosis. For example, in tumors of the breast I have demonstrated pretty conclusively that the clinical signs which can be looked upon as pathognomonic of carcinoma in a tumor of the breast do not hold good for tumors elsewhere.

For this reason it is worth while to add to one's personal experience the wealth of knowledge from the literature, so that one may have a greater experience for application in the differential diagnosis of the rarer tumors of the extremity.

Epithelial Cysts. The acquired or congenital epithelial cysts are not often met with on the extremity. In the neck epithelial cysts are common, due to the embryonic residues of the branchial cleft. In the skin of the extremities, axilla, and groin tumors from congenitally displaced epithelium are possible—the dermoid cysts. Cystic tumors of the glands have been observed, and then there are the acquired cysts due to traumatism. I have observed a number of epidermal and subepidermal tumors, usually pea- or bean-size, in which there has been a history of a trauma or infection and which, on microscopic study, show an epithelial lining preserved in part or whole, with evidence of chronic inflammation in the wall and foreign body giant cells. The practical question, however, is to recognize when such a cyst is malignant. Recently a cystic tumor of the scalp was sent to the laboratory under the diagnosis of a benign atheroma. The operator had not recognized that the thickened wall was not that of a benign cyst, but a malignant one. Some years ago a cyst was removed from the scalp under the diagnosis of a wen; it contained blood, and within the wall there was friable, hemorrhagic tissue. Studied microscopically, the cyst proved to be a perithelial angiosarcoma. On two occasions there have been sent to my laboratory cystic tumors of the groin, with the note that the patient had been operated upon, one and three years previously, for malignant epithelioma of the vulva. The operator had not recognized the cyst due to degeneration of a carcinomatous metastatic gland. Quite often, in the lymphatic gland, the metastatic squamous epithelial cell produces a cystic tumor formation very much like a dermoid or atheromatous cyst. These conditions can and should be differentiated. There may be a long interval. I have observed such a cystic tumor beneath the chin eight years after the operation for a malignant epithelial growth of the lip, and Emil Ries¹ has observed a nine years' interval between the removal of the carcinoma of the uterus and the involvement of the inguinal glands.

On epithelial cysts, benign and malignant, of the extremity, I cannot find much literature.

There is a recent report by Zimmermann² on rare forms of atheroma.

¹ Surgery, Gynecology, and Obstetrics, 1906, vol. iii, p. 575.

² Archiv f. klinische Chirurgie, 1909, vol. lxxxviii, p. 903.

He reports three cases and gives eight references to the literature. His third case is the one which I wish to employ to illustrate some of the difficulties in the differential diagnosis between a benign and malignant epithelial cyst. Zimmermann employs the term atheroma to indicate a cyst lined by squamous epithelium of congenital origin, that is, a simple dermoid, one in which there is no other product of the epithelium. For practical purposes it makes no difference, because, from my experience, the differential diagnosis must rest upon the appearance of the wall and not the contents, as this may be the same in the benign and the malignant. The thickened wall, and especially the papillomatous growth, gave rise to a suspicion of malignant tumor. The patient was forty-eight and had observed a tumor of the scalp for fifteen years; there has been growth the last five years. On palpation, the harder nodule in one end gave rise to the conclusion that a malignant change may have taken place. I have had considerable experience with benign and malignant cysts, and it is possible to have a malignant change without perforation outward of the connective-tissue wall, but it would be very unusual to have preserved such a perfect cyst wall at the base of the papilloma if the comparatively large introcystic tumor were malignant.

Zimmermann is also interested in the connective-tissue changes in these epithelium-lined cysts. There may be calcification, and even ossification, in the wall, and when the epithelial lining degenerates, the connective-tissue grows into the epithelial debris with foreign-body, giant-cell formation and gradually absorbs it. Papillary growth within an atheromatous or dermoid cyst is comparatively rare. The giant-cell formation is common. The microscopic appearance of this case of Zimmermann is of great practical importance, because, in the frozen section, one should recognize this as a benign epithelial growth.

The epithelium-lined cysts are not infrequent tumors, and may be expected almost anywhere. They must be considered in the differential diagnosis, and at the operation one must be prepared to differentiate the benign from the malignant.

In the differential diagnosis between solid and cystic subepidermal tumors, I wish to call attention to two rare conditions—Riga's disease and amyloid tumors.

Riga's Disease. Here we have an example of a border-line condition between tumor and inflammation. The lesion is evidently due to mechanical irritation. It is well described by Schulz.¹ Histologically, there is an hypertrophy of both the mucous membrane and the submucosa. The little tumor, which varies in size from a pea to a bean, is situated on the frenum of the tongue in nursing infants.

In the early stage there is ulceration called by Schulz *papilloma granulosum*. As the ulcer heals and scar tissue forms, the condition becomes a *papilloma fibrosum*.

¹ Mittheilungen a. d. Grenzgeb. d. Med. u. Chir., 1908, vol. xix, p. 249.

This is an example of a tumor best left alone. Schulz has observed 18 cases, and his observations apparently agree with other published cases. The tumors are observed in infants usually between the age of one and two years. These infants, in nursing, suck with the tongue, the upper incisors are absent, the lower incisors are present, slightly bent backward, and have rough points. As a rule, the mothers have depressed nipples, and nursing is difficult. Schulz is of the opinion that in such children the ragged incisors dislocated backward irritate the mucous membrane of the frenum, and the tissues react with an hypertrophy of the mucous membrane, with slight ulceration. Schulz also concludes from his observation that, in addition to the mechanical element, the affected infants later in life show evidence of tuberculous disease of bones or joints. At the time of the tumor formation many of the cases are apparently well, a few have grave gastro-intestinal complications. In these latter cases the prognosis is very serious. Schulz has observed the tumors from one to thirteen months after the onset. They, as a rule, spontaneously disappear after the appearance of the upper incisors. As to treatment, he advises: filing of the lower incisors, reduction of the posterior deformity, treatment to encourage the appearance of the upper incisors, in grave cases extraction of teeth and weaning. In addition one must recollect the possibility of tuberculosis, and institute general treatment for this.

Schulz is also of the opinion that Riga's disease is not as rare as the authors of reports in the literature record, nor does he think that it is a disease more common in Italy. Four of his cases he observed in Asia Minor and 14 in Brest, Russia.

Osler¹ speaks of Riga's disease as a curious affection observed chiefly in southern Italy in both healthy and cachectic children; he also notes that it may be epidemic, and that it may be a complication of whooping cough.

Rotch² does not index Riga's disease.

Amyloid Tumors. The case reported by Gross³ demonstrates the importance of a positive diagnosis before instituting any radical treatment for a tumor the radical removal of which involves mutilation.

The patient of Gross was fifty-seven years of age, and had observed a swelling in the centre of the posterior portion of the tongue five weeks, and with this, difficulty in swallowing. On examination, one could see in the centre of the posterior portion of the tongue a slight elevation, about the size of a penny. The mucous membrane over this slightly elevated subepidermal nodule was intact. The tumor could be felt deeper in the muscle of the tongue, quite circumscribed. The left

¹ Practice of Medicine, sixth edition, 1906, p. 435.

² Pediatrics, fifth edition.

³ Deutsche Zeitschrift f. Chirurgie, 1906, vol. lxxxiv, p. 462.

submaxillary lymphatic glands were palpable. At first sight Gross thought he might be dealing with a carcinoma, but the intact epidermal covering he looked upon as evidence against a carcinoma. A small piece was excised, and the frozen section showed connective tissue of a character with which he was not familiar. For this reason the tissue was sent to Borst, of Göttingen, one of the greatest German authorities on tumors. The report returned was: benign amyloid tumor. This diagnosis, of course, contra-indicated any extensive operation as unnecessary. Gross excised the tumor by splitting the cheek and pulling out the tongue to allow better exposure. The wound was closed and the patient did well. The difficulty in swallowing immediately disappeared, and one year later the patient was perfectly well. Of course, there was no objection to the local excision of the tumor, but in view of the diagnosis, it is a question in my mind whether it was really necessary.

I would have preferred to wait until the evidence of further growth and difficult deglutition justified the procedure. These rare tumors are not malignant, nor have they any tendency to become malignant. They have been observed beneath the epidermis of the respiratory tract, in the nose, tongue, trachea, and lung. As a rule, they have been accidental findings at autopsy and during life had given their hosts no discomfort. Eight cases have been reported as situated in the tongue, one only subjected to operation during life. This one was the size of a walnut and pedunculated. All of these tumors were situated on the base of the tongue. In my experience this situation practically excludes carcinoma, which, as a rule, arises more anteriorly. From Borst's description we can recognize these amyloid tumors histologically by finding masses of tissue in places, calcified with here and there a round or spindle-shaped nucleus, and these masses of tissue give the amyloid reaction. There should be nothing, therefore, in the gross or frozen section to suggest a malignant tumor. The suspicion would be aroused as to its nature by the presence of these areas of degeneration and calcification. The correct diagnosis would only be possible by using the amyloid reaction.

Another case in point, illustrating the importance of differential diagnosis before instituting treatment, is by Sebileau and Pautrier.¹ Here the tumor of the tongue looked at first sight like a malignant one, but the history of twenty-five years' duration could be considered evidence against malignancy. For ten years the present single tumor had consisted of two smaller ones; these then coalesced, and for four years there had been some growth. The present tumor projected 1 cm. from the left side of the middle third of the tongue, and was 2 by 3 cm. in diameter. Its surface was somewhat fungous, due, however, to hypertrophy of the mucous membrane in the papillary form, while anteriorly the mucous membrane was sclerotic. Although the reporters in this

¹ *Centralblatt f. Chirurgie*, 1905, vol. xxxii, p. 954.

case state that this lesion simulated cancer, I am of the opinion that it did not. From this clinical history and appearance the chances were that the condition was benign. Their statement also that many of the examples of cured cases of cancer of the tongue belong to this variety of tumor must be questioned.

I report this amyloid tumor of the tongue and this benign papilloma with sclerosis of the tongue to demonstrate that in a region where the majority of tumors are malignant, we must be on the lookout for the benign, and before performing any mutilating operation, like the radical excision of the tongue with the glands of the neck, a correct diagnosis must be made. In this papillomatous tumor reported by Sebileau and Pautrier, a microscopic examination of an excised piece showed it to be benign.

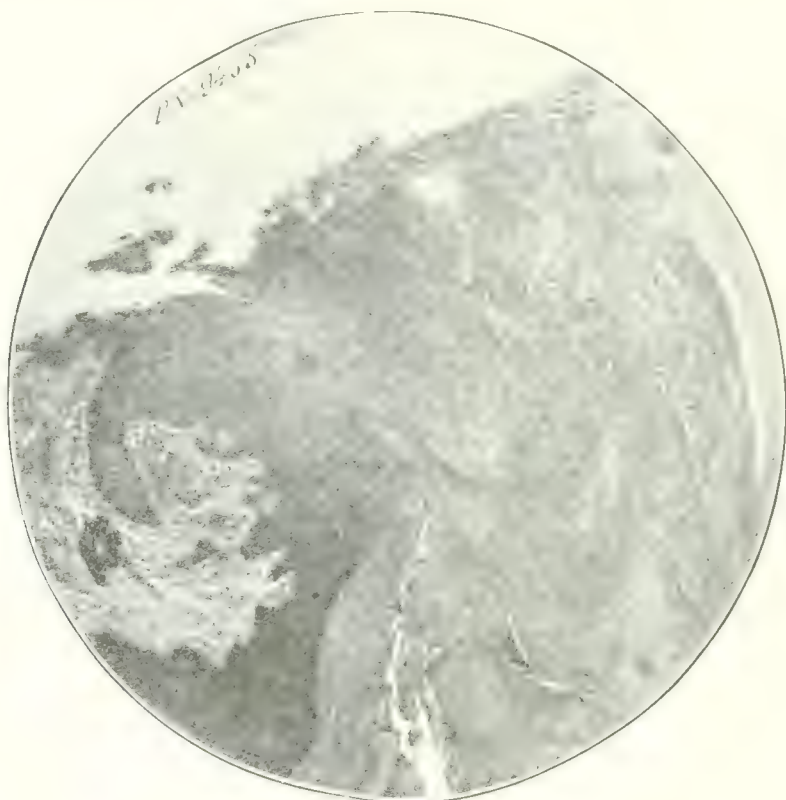


FIG. 21

Solid Epithelial Tumors. As in tumors of the lip, so in tumors of the skin of the extremities, there is opportunity for microscopic study of the locally excised lesion before a decision is made as to the necessity of an operation upon the neighboring lymphatic glands. In very early cases the question is often very difficult to decide. Fig. 21 is a section shown to me by Dr. M. L. Moss in February, 1909. The patient was a white female, aged sixty-five years, who had observed on the dorsum of the right hand a small horn-like tumor of six months' duration. It was excised locally. The photomicrograph is taken from the edge of the tumor: to the left is seen the slightly thickened, but normal, epidermis; then the downgrowth and upgrowth of the epidermal tumor; the contrast between

the normal epidermis and the epithelial cells of the tumor is marked; the basal epithelial cell is lost in many places and is replaced by a cell of the type of the superficial layers, and there is no sharp differentiation at the border-line between epithelium and connective tissue. Histologically, I think, one can say that this tumor is a carcinoma. In my own experience I have seen a similar tumor on the lower lip (Fig. 22)

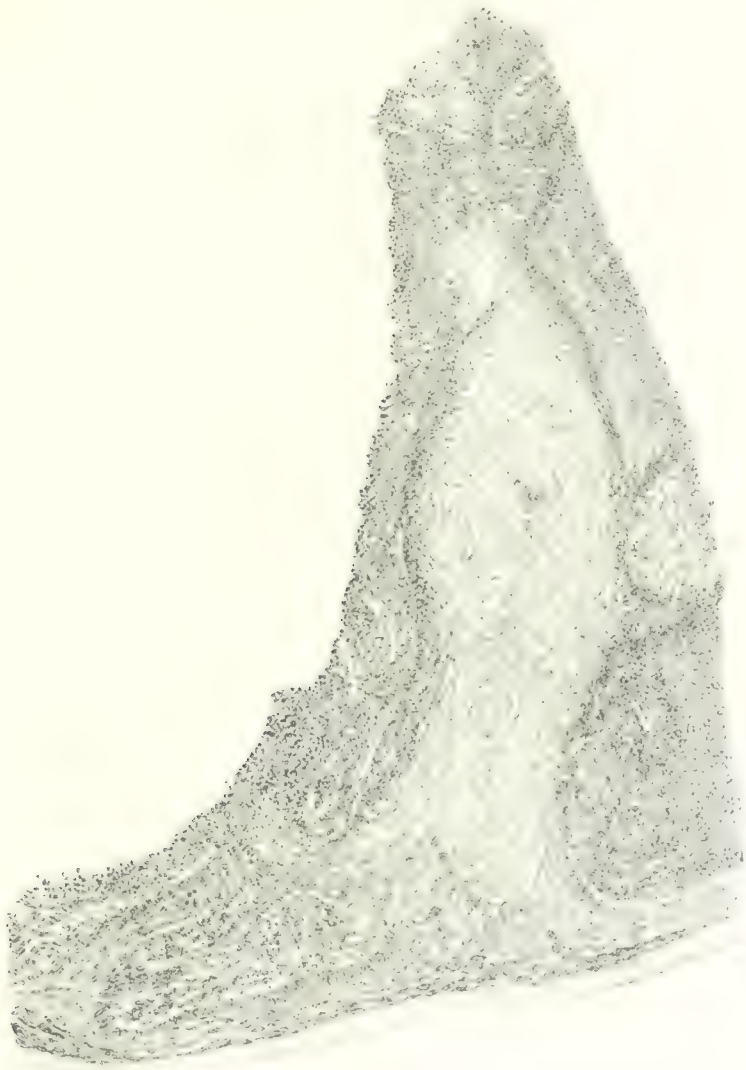


FIG. 22

associated with metastasis to the glands of the neck (this patient has remained well twelve years after the local and glandular operation), and one situated on the skin of the chest wall to the outer and lower quadrant side of the breast. In this case the tumor only was excised. The patient returned in three years with enlarged glands in the axilla; a cure was not accomplished by their excision at this time.

Metastasis, however, is not always associated with such early carcinomas as illustrated microscopically in Figs. 21 and 22. It is beginning to be the opinion of the majority who are studying this question that in all such cases the glandular operation should be performed;

it adds very little to the extent of the intervention, and undoubtedly will increase the number of cures.

In Fig. 9, in *PROGRESSIVE MEDICINE*, December, 1904, p. 141, there is illustrated a section of a hornified wart. This tumor was situated upon the hand, and had been present at least two years; the ulceration had followed the application of caustics. The tumor was 1 cm. in diameter and 5 mm. in height. I decided in this case that the glandular operation was not necessary. The after history of this case shows that their opinion was correct. It is nine years since the operation, and the patient is well—a man now over seventy years of age.

It is sometimes difficult in the gross to distinguish between the carcinoma spinocellulare and the basocellulare, or Krompecher's tumor.

For example the Plate illustrates a fungous tumor of the skin of the neck. The patient was a white male, aged forty-four years. In the position of the present fungus the patient has observed some trouble for at least three years; first, there was a sensation of itching which caused him to scratch the area; scabs formed which never healed. The present fungous formation has been observed at least a year. The surface of this tumor preserved at the edges the papillary form of the benign or early malignant skin cancer, but on section (see Plate) the little fungous tumor had the white parallel rays so characteristic of the spinal-cell tumor. Under the microscope, however, it is a basal-cell cancer. These malignant basal-cell papillary warts are rare. In *PROGRESSIVE MEDICINE*, December, 1904, p. 148, Figs. 16 and 17, I have illustrated in the gross and microscopically a somewhat similar tumor in which no recurrence has been observed many years after local excision only. In the present case, illustrated in the Plate, it was very convenient to be able to differentiate, because it allowed me to excise the lesion under cocaine locally. This August, 1909, it is three years since operation, and there is no evidence of recurrence.

In my experience the surface appearance and the marked induration of the subepidermal border are only associated with carcinoma spinocellulare. In the gross section we have a typical cancer in which the white lines and dots of epithelial necrosis and hornification are scattered irregularly and give an entirely different architectural scheme from that in the Plate. The microscope showed that we were dealing with a carcinoma spinocellulare. Fig. 30, p. 159, in *PROGRESSIVE MEDICINE*, December, 1904, illustrates the microscopic appearance. There is no doubt in my mind that the glandular operation should have been performed in this case, but the patient, a white male, aged sixty-six years, refused anything but the local excision under cocaine. The lesion was of but nine months' duration, and began as a small pimple. For scientific purposes this case will be an interesting one. One year after operation there was no evidence of glandular involvement, but this does not exclude its possibility as yet.

In the following case the surface and gross section of an ulcer with



Epithelioma of neck.

papillomatous areas would be difficult to distinguish, except by the microscope, between the basal and spinal-cell tumor. This lesion was situated on the dorsum of the foot in a white male, aged sixty-five years; the lesion followed traumatism; there had been an injury with a piece of copper three years ago; at the site of the injury a nodule appeared; it remained quiescent until three months ago, when the nodule changed to a pimple; the epidermal covering was removed by trauma and the present ulcer formed. Microscopically (Fig. 23), it is a border-line

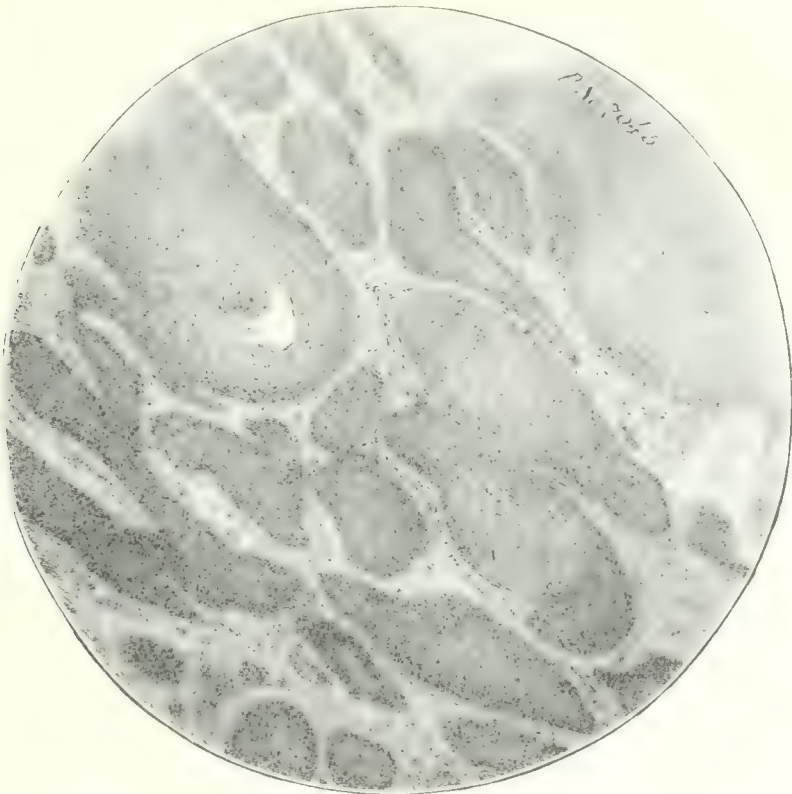


FIG. 23

tumor between the carcinoma spinocellulare and cubocellulare. In my experience, however, this differential diagnosis is of no practical importance, because, from the standpoint of malignancy, they are identical and should both receive the same local and glandular operation. Fig. 27 in *PROGRESSIVE MEDICINE*, December, 1904, p. 157, is a good example of a fungous tumor. Microscopically, it was composed of the transitional epithelium (carcinoma cubocellulare). Only a local operation was performed. The patient died of local recurrence and involvement of the glands eight months after operation.

Further observations, therefore, demonstrate that in carcinoma of the extremity the same principles now established in the treatment of carcinoma of the breast and lip are applicable, and glandular operations should be performed when the gross and microscopic study of the lesion indicates it.

Epithelioma Basocellulare. This terminology has not been universally accepted, but it is very important that this group of tumors should be looked upon as a distinct one. M. B. Hartzell,¹ in describing and illustrating a tumor of this class, calls it a benign cystic epithelioma, and does not mention Krompecher. The tumor from which my section was made was a small epidermal, slightly pigmented nodule, smaller than a pea, situated on the skin of the face near the nose. It is more than twelve years since its excision, and there is no recurrence. Hartzell's patient was a female, aged twenty-nine years, and the tumors were multiple; they were shot-size to pea-size, flat, sessile tumors, situated on the face and neck; they were pinkish or red, a few had crusts covering shallow ulcers. Hartzell concludes that the tumors originate in hair follicles, and that they should be called, after Jarisch, *tricho-epithelioma*; that in a certain number of cases there is destructive ulceration and malignant transformation.

Glimm² reports an interesting basal-cell cancer which appeared as a fungous tumor in the skin of the axilla. Glimm was interested in this tumor, because the enlarged axillary glands removed at the operation showed no evidence of metastasis, and because the surface of this tumor showed an unusual form of hornification.

I have observed this form of hornification at the edge of a basal-cell ulcer of the finger. The case illustrated in Fig. 11, p. 200, of *PROGRESSIVE MEDICINE*, December, 1907, shows a benign hornified growth, which, histologically, resembles somewhat Glimm's case, but there is no basal-cell tumor beneath it. Glimm's case also demonstrates that palpable glands in the neighborhood of an ulcerating tumor are no indication of metastasis, and one must depend more on the character of the local growth for one's indication as to glandular operation. Glimm's patient was a male, aged sixty-one years; the tumor began as a pea-sized nodule one year ago; its rapid growth and ulceration was of about six weeks' duration. It was a large fungous growth, with surface diameters of about 6 cm. and a height of about 2 cm. At the epidermal edge there were warty elevations, the surrounding skin was slightly hyperemic, and there was dilatation of the veins. The peculiar hornified areas shown in the illustrations could be made out in the gross as they appeared as small, yellow masses. Glimm does not discuss whether they looked like the sulphur granules of actinomycosis. About these masses, under the microscope, there were numerous foreign-body giant cells.

Csillag,³ in describing tumors similar to that of Hartzell, agrees somewhat with his conclusions, that the cells are undifferentiated embry-

¹ *Journal of Medical Research*, 1908, vol. xviii, p. 159.

² *Archiv f. klinische Chirurgie*, 1905, vol. lxxvii, p. 172.

³ *American Journal of the Medical Sciences*, 1908, vol. cxxxvi, p. 308; *Archiv f. Derm. und Syph.*, Band lxxx, Heft 2.

onic epithelium originating partly from the epidermis and partly from the hair follicles.

Veit,¹ from the surgical clinic of Tilmann, discusses very interestingly his own observations and the literature of the non-hornifying squamous epithelial cancer of the external skin, which must be differentiated from Krompecher's basal-cell epithelioma. Rehn,² from Lexer's clinic in Königsberg, warns against the *x*-ray treatment of these little, apparently innocent basal-cell epitheliomas, the form of skin cancer which, up to the present time, many authorities are of the opinion can be cured by the *x*-ray. Rehn reports recurrences, and has also demonstrated the tumor microscopically in apparently healed *x*-ray scars. He advises excision only. My experience agrees with Rehn's. I now have a record of at least six typical basal-cell epitheliomas, properly treated and apparently cured by *x*-rays, which recurred; they have not recurred since local excision, nor have I ever, in my own experience, seen a recurrence of a basal-cell epithelioma removed locally with the knife.

Pigmented Moles. In PROGRESSIVE MEDICINE, December, 1903, p. 149, I looked upon these tumors as lymphangioma, and discussed the benign tumor with other connective-tissue tumors, and the malignant tumor with sarcoma of the skin. However, I referred to Unna, who in 1893 was first to advocate that these tumors were really carcinoma. That is, the cell which we find beneath the epidermis is not a connective-tissue cell (endothelium), but a misplaced basal epithelial cell; that the tumor, therefore, is really an epithelioma. Since then I have discussed this tumor in almost all my contributions to PROGRESSIVE MEDICINE. I have called attention to the fact that for the malignant tumor, with its metastasis, there are no recorded permanent cures, and for this reason it is incumbent upon the profession to make a routine examination of their patients for prominent moles, especially in positions exposed to frequent trauma. It is the duty of the physician or surgeon to advise, nay, more, to urge the local removal of these pigmented tumors. This was the position I took in 1903. Dr. W. W. Keen,³ in 1904, before the Section on Surgery, read a paper entitled "The Danger of Allowing Warts and Moles to Remain Lest They Become Malignant." Since then I have referred again and again to this subject. For a number of years in teaching surgical pathology, I have placed the benign and malignant mole in a class by themselves. It makes very little difference whether you call them sarcoma or carcinoma; their local growth and their metastases by blood and lymphatics are so different that it is best to consider them separately. Up to the present time I have not seen, in an experience of now almost fifty cases, a single cure of the malignant tumor, even in cases in which extensive glandular operation had been

¹ Deutsche Zeitschrift f. Chirurgie, 1908, vol. xciv, p. 346.

² Münchener medicinische Wochenschrift, 1909, No. 4.

³ PROGRESSIVE MEDICINE, December, 1904, p. 174.

performed, nor a single authentic case in the literature. One of my colleagues of the Clinical Society of Surgery showed me what he looked upon as an example of a cure; but on subjecting the pigmented mole removed from the cheek and the glands removed from the neck to most careful histological study, we could be quite positive that there were no metastases to the glands, and almost equally so, that the mole itself was still benign. For this reason it is natural to question the two reported cures of Pringle.¹ Unfortunately I only have the review.² He reports a girl, aged seventeen years, with a hazelnut pigmented mole of the hand in which the tumor and metastatic axillary glands were removed, the patient being well five years after operation; and a second case, a male, aged thirty years, apparently cured three years after removal of a cherry-sized nodule in the skin of the left elbow and glands in the axilla. Pringle takes the same view as to the importance of early operation as expressed in this contribution. Now and then the interval of time in these malignant moles may be five years. In a case which I saw with Crile, of Cleveland, the pigmented tumor had been present on the toe over three years and the enlarged glands in the groin at least three years. This patient lived about two years after operation. From my experience, therefore, Pringle is either mistaken as to the metastases in his cases, or they may represent the rare exceptions to the usual rule.



FIG. 24

Benign Connective-tissue Tumors. Lymphangioma. In *PROGRESSIVE MEDICINE*, December, 1904, p. 144, Fig. 11, I illustrated the papillary epidermal hypertrophy which frequently accompanies elephantiasis, but I did not at that time emphasize the cystic areas in the papillæ

¹ *Edinburgh Medical Journal*, June, 1908.

² *Zentralbl. f. d. Grenzgeb. d. Med. u. Chir.*, 1909, vol. xii, p. 317.

which communicated with dilated lymph spaces elsewhere. I am reminded of this case by a recent report of Rehn,¹ and I wish to use this case to emphasize this papillary hypertrophy which may be associated with local elephantiasis and give rise to tumor formations which must be differentiated from malignant growths, and for which local excision is sufficient.

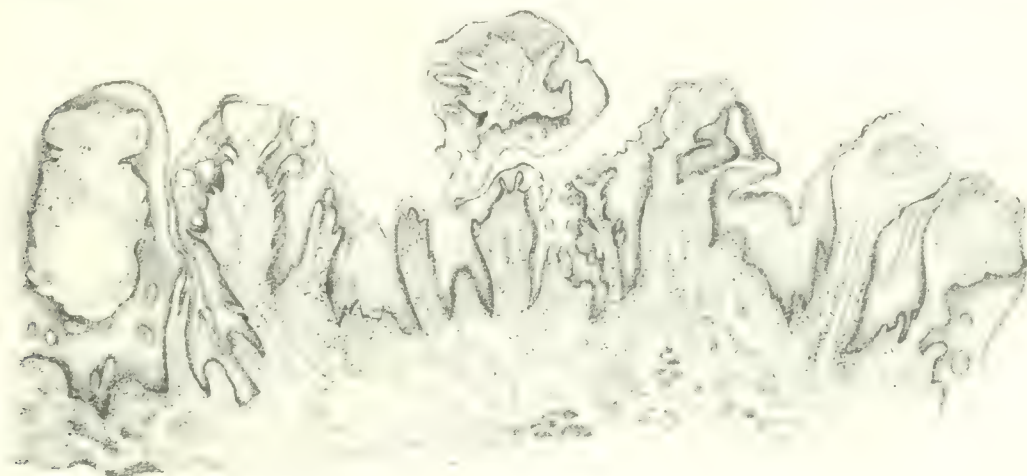


FIG. 25

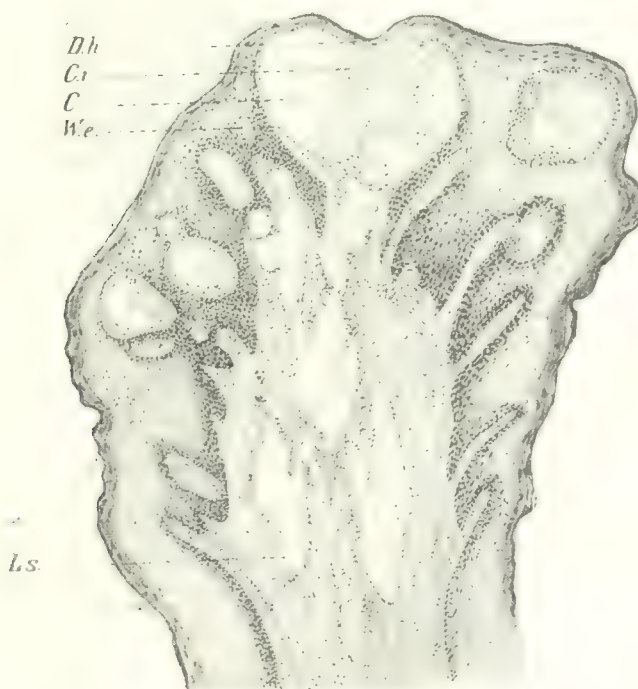


FIG. 26.—*L. s.*, the endothelium-lined dilated lymph spaces in the connective-tissue stem of the papilla; these communicate with the cyst (*C*) within the epidermis. This cyst is lined by epithelium (*W. e.*) and contains degenerated epithelial elements (*C. i.*); on the surface there is a thin epidermal covering (*D. h.*).

Fig. 24 illustrates the local growth on the right half of the tongue. The patient was a boy, aged eight years, and the tumor had been present six years. It began as a small nodule, and has gradually reached the

¹ Archiv f. klinische Chirurgie, 1909, vol. lxxxviii, p. 1053.

present size. It projects from the tongue about 6 mm. and measures 5 by 3 cm. on the surface. It is composed of papillæ, some of which look like vesicles. On section, under the low power (Fig. 25), the hypertrophy of the epidermis and the papillary body and the cystic degeneration of the papillæ is beautifully shown. A section of one of the papillæ under high power is illustrated in Fig. 26.

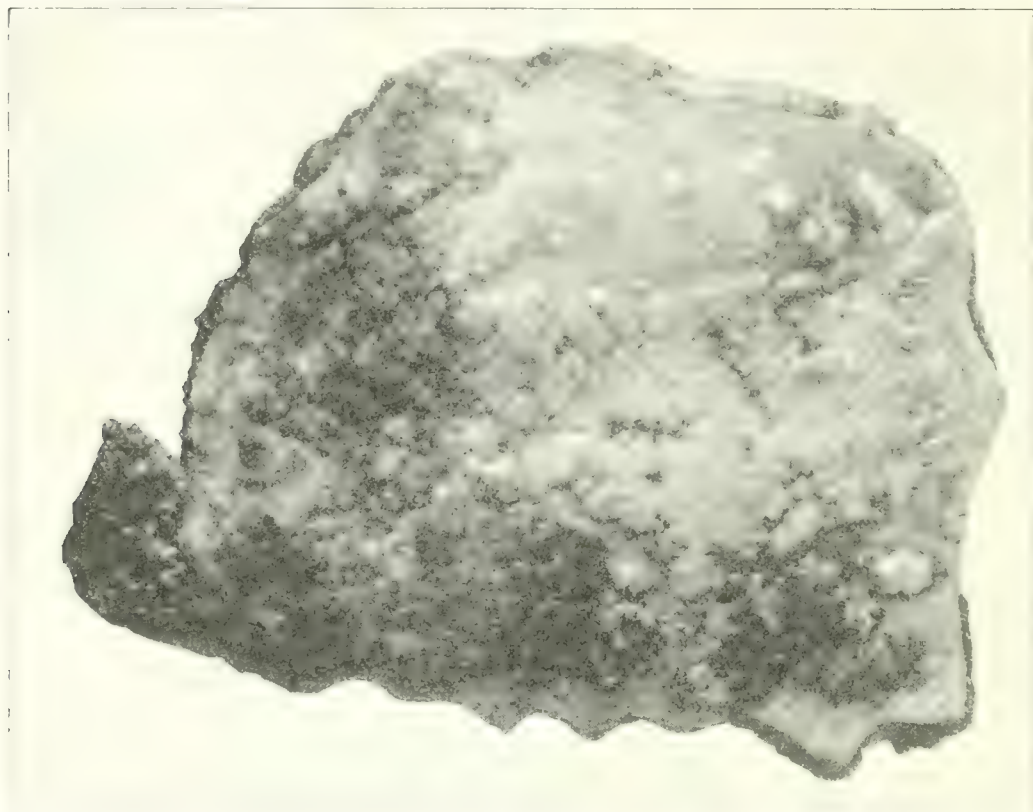


FIG. 27

I have observed a similar tumor in the groin which had been previously seen and reported by Gilchrist as lymphangioma circumscriptum. Fig. 27 shows the gross appearance in this case. This patient has remained well ten years since excision. This localized elephantiasis with what might be called cystic degeneration of the epidermis I have quite frequently observed in small tumors of the skin which have become constricted at the base.

Elephantiasis. Since my last discussion¹ I find nothing new, except a reference to a special treatment advocated by Handley, of Middlesex Hospital. The report comes from Lexer's clinic in Königsberg, by M. Draudt.² It was a case of elephantiasis following extensive erysipelas of the lower extremity. Handley's treatment was tried. This consists in placing subcutaneous silk threads with the object of creating new lymph channels. In the case reported the limb was reduced in circumference 30 cm. in eight days. As the average circumference of a thigh

¹ PROGRESSIVE MEDICINE, December, 1908, p. 219.

² Centralblatt f. Chirurgie, 1909, vol. xxxvi, Suppl. No. 31, p. 115.

is about 60 cm., one can get an idea of the tremendous reduction. In this case the reduction still continued at the time of the report, ten weeks later, and there has been no trouble from the buried silk in spite of the previous erysipelas.

Lymph Cysts. In *PROGRESSIVE MEDICINE*, December, 1905, p. 249, I mentioned these interesting cystic tumors which have been observed chiefly on the thigh. Mitchell's case, which I examined, was undoubtedly tuberculous. Nordmann's case was of traumatic origin, Strehl and Narath's, tuberculous; Baer's observation, which I studied carefully pathologically, had become a malignant endothelioma, and the patient died of metastases.

In February, 1908, I removed a cyst which was situated between the fascia lata and the muscles on the outer side of the thigh. The fluid was clear, with a few yellow flakes; the cavity was lined by a firm, red, narrow zone of granulation tissue 1 mm. in thickness; on the surface of this reddish membrane there were numerous pinhead excrescences, redder in color than the smooth areas between; when brushed with a sponge this surface bled. This tissue rested upon a fibrous base. The cyst with its connective-tissue wall could be easily separated from the muscles, which showed no infiltration. Histologically, I could make out tubercles in the granulation tissue. I had operated on this patient some five months previously for tuberculosis of the knee, which at that time had suppurated and formed sinuses, and I looked upon this tuberculous lymph cyst as representing an old tuberculous sinus communicating with the tuberculous knee.

Minssen and Weydemann¹ report the most recent observation. The anatomical position of the communicating retroperitoneal cyst and the cyst on the anterior surface of the thigh correspond with Strehl and Narath's cases. It differs, however, in that the cysts were bilateral. The contents and the walls of both cysts, according to the observers, resembled more Narath's, but, microscopically, the tubercle and giant cells found agree with Strehl's findings.

The patient was an apparently perfectly healthy woman, aged twenty-five years; the swelling of both thighs had been gradually increasing for two years without pain, tenderness, or fever, and the examination was negative, except for the tumors. The right thigh was the larger. There was an anterior, an external, and a medial bulging. The swelling over the adductors on this side was so great that the thighs touched when the patient walked. The swelling on the left was in the same position, but smaller. In both, the swelling began a little below Poupart's ligament, and on the right extended to about the lower third of the thigh. The tumors felt tense and elastic. The retroperitoneal portions were not made out until at operation. The tumors were considered lipomas, although the possibility of cysts was also borne in mind.

¹ *Deutsche Zeitschrift f. Chirurgie*, 1906, vol. lxxxiii, p 577.

At the operation, on the left side, the cyst occupied Scarpa's triangle, extended down the femoral canal, touched the periosteum of the femur in the middle third, and sent a process behind the femur. In enucleating the cyst the fasciæ of muscles were seen to form its walls, and ragged muscle surface was left after dissection. The femoral vein, although close to the wall, was not adherent. The cyst was enucleated up to Poupart's ligament. Here it contracted, entered through the canal, and communicated with a larger cyst above. Pressure on the left side of the abdomen evacuated fluid. Further dissection was discontinued, and the retroperitoneal portion drained. The right cyst was first simply aspirated and later drained. In both cysts the contents consisted of a serous fluid which contained large lymph flakes. The fluid contained albumin, and the sediment leukocytes, large cells, and a granular detritus. The patient suffered first from infection and later from iodoform poisoning due to the injection of glycerin and iodoform, but finally, after three months, recovered her previous strength and weight, and at the time of the report was well, except for two fistulæ from which there was a scanty discharge.

It should be remembered that Strehl's patient, who at the time of the report also had a fistula, died three years later of some unknown cause, probably tuberculosis, and that Mitchell's patient developed tuberculosis of the ankle on the opposite limb. An examination for tubercle bacilli in the wall of the left cyst in the case under discussion was negative.

Hemangioma. Oppenheim,¹ by injecting into a freshly excised nevus a solution of Berlin blue, has demonstrated that there is a direct communication between the normal bloodvessels about the tumor and the vessels of the angioma. Novak² reports a very interesting case of a hemangioma and lymphangioma (hematolymphangioma). The microscopic illustrations are unusually good and the literature complete. There is nothing, however, difficult in differentiating this tumor from the malignant one. The endothelial and perithelial cell proliferation is not marked. I wish to call attention here, however, to the fact that not infrequently lymphangioma or hemangioma may be difficult to differentiate from sarcoma, especially if the tumor has ulcerated. Dr. George Ben Johnston, of Richmond, Virginia, and Dr. Wainwright, of Scranton, Pennsylvania, have sent me pieces of tissue from such tumors which at first sight could be easily mistaken for sarcoma. The subsequent events in these two cases have confirmed my diagnosis of a hemangioma. As I expect to report these cases, I will discuss this important practical question in the differential diagnosis of tumors in *PROGRESSIVE MEDICINE* for December, 1910, with illustrations.

The most interesting subject in cutaneous and subcutaneous hem-

¹ Frankfurter Zeitschrift f. Pathologie, 1907, vol. i, p. 124.

² Archiv f. klinische Chirurgie, 1908, vol. lxxxvi, p. 873.

angioma, is their treatment with Pusey's *carbon dioxide snow*.¹ Sauerbruch,² who had witnessed this treatment on a recent visit to Chicago, gives a brief report of his results. He finds it efficient and practical, and I also find that it is employed by Trendelenburg in his clinic in Leipzig. Wolf,³ in reporting two interesting cases of extensive congenital angioma of the face, with changes in the skeleton of the face disclosed by the *x-ray*, mentions this treatment. In the ready acceptance of this treatment by Sauerbruch and Trendelenburg one could find a theme for discussing the advantages of visiting other clinics in your own and foreign countries. New and practical methods of treatment are better exchanged in this way than through the literature.

Nothing interesting has appeared on *primary angioma of muscle* since the monograph of John Staige Davis.⁴ During the last year Dr. Bolgiano, of Baltimore, referred to me a patient with a tumor of the right cheek; she was thirty years of age, and the tumor had been present at least three years. The patient was positive that the tumor changed in size; it was most noticeable when she wore a tight collar; the tumor was situated in the masseter muscle and was about the size of a plum, distinctly compressible, and, on palpation, I could make out small, hard bodies. These I naturally concluded were phleboliths. The skin of the cheek was unaffected. At operation I found a cavernous angioma, many of the blood canals were thrombosed and contained phleboliths, others were filled with blood. After excision, without injury to the mucous membrane, I employed the Paquelin cautery and closed without drainage. The wound healed per primam, and the induration in the scar disappeared in about six months. Angioma of the masseter muscle has been observed before.

Since the report of my own observation of a blood cyst in Scarpa's triangle⁵ and the scanty literature found at that time, I have been unable to discover any further reports of blood cysts of the extremity. In the surgical records of Dr. Halsted's clinic of the Johns Hopkins Hospital there is but one blood cyst. This was observed in the neck, in a male adult, and the tumor had been present a number of years. It was successfully removed by Dr. Halsted. Grossmann,⁶ in his inaugural dissertation, collects forty-one cases of blood cysts of the neck, all of congenital origin. In his case, observed in Tilmann's clinic, the tumor was found in a child one day old, on the right side of the neck; on aspiration it contained coffee-stained fluid; a good result was obtained from incision and packing. Spannaus,⁷ from Kuettner's clinic, presents the subject of blood

¹ Journal of the American Medical Association, 1907, p. 1354.

² Centralblatt f. Chirurgie, 1909, vol. xxxvi, p. 1.

³ Beiträge zur klinischen Chirurgie, 1909, vol. lxiv, p. 130.

⁴ PROGRESSIVE MEDICINE, December, 1908, p. 177.

⁵ Ibid., December, 1905, p. 257.

⁶ Centralblatt f. Chirurgie, 1907, vol. xxxiv, p. 32.

⁷ Beiträge zur klinischen Chirurgie, 1909, vol. lxiii, p. 290.

cysts of the neck most interestingly and gives the literature up to date. This may be looked upon as the most recent contribution. He makes the statement that "blood cyst" must be looked upon as a clinical and not an anatomical term, because the cysts are not necessarily connected with bloodvessels, but may be endothelium-lined (lymph cysts) or epithelium-lined (branchial cleft) into which hemorrhage has taken place.

Fibroma. In *PROGRESSIVE MEDICINE*, December, 1903, p. 147, I first introduced the discussion, in general, of benign and malignant tumors. Up to that time I had discussed bone tumors only. Since then I have attempted to present a continuous story of the literature and my own experience. Of the connective-tissue tumors the fibroma and its combinations are the most numerous. In studying these tumors, we have first the interesting clinical and pathological question to decide between a neoplasm or true tumor, on one hand, and the product of inflammation, on the other. And then, again, between the fibroma and the sarcoma. A very interesting observation from Kuettner's clinic, in Breslau, by Fritsch¹ gives an opportunity to repeat a very practical discussion on this very important subject of differential diagnosis. He reports two cases of what he calls diffuse giant-cell sarcoma of tendon sheaths. After reading his two cases carefully, and comparing them with my own observation, I am compelled to disagree with the nomenclature. In the first place, they are not sarcomas, but benign connective-tissue tumors. Giant cells, as I have frequently pointed out, do not always by any means indicate a giant-cell tumor. Undoubtedly these growths are tumors of tendon sheaths.²

The first case is almost identical with an observation of my own.³ The patient was a male, aged thirty-one years. The tumor shown in Fig. 28 had been present since early childhood; first the size of a cherry stone, between the tendo Achillis and internal malleolus, it has grown gradually in the twenty-odd years to the present size. Compare this with the illustration of my case,⁴ in which the patient was a male, aged forty-six years, and the tumor of twenty-four years.

At operation this tumor was adherent to the tendon sheath and extended between the tibia, os calcis, and astragalus. In making the dissection there was a good deal of oozing, yet the operator removed nothing but the tumor, did not divide any tendons, nor remove any bone—a treatment, therefore, which was only applicable to a benign lesion. In the case observed by me, tumor tissue was left behind, yet there has been no recurrence now, twelve years since operation. In describing the fresh appearance of his tumor Fritsch writes that it looked like adrenal tissue. Now, adrenal tissue is mottled, white, and

¹ Beiträge zur klinischen Chirurgie, 1908, vol. lx, p. 344.

² *PROGRESSIVE MEDICINE*, December, 1903, p. 171.

³ *Ibid.*, p. 154, Figs. 16 and 17.

⁴ *Ibid.*, p. 154, Fig. 16.

red. I think I am justified, from this very meagre statement, to conclude that it resembled the gross appearance in my case.¹ In his histological note Fritsch describes a fibro-angioma, or an elephantoid angioma in which there are foreign-body giant cells, and then he concludes that it is a giant-cell tumor. He speaks of a very vascular tissue, blood-vessels with thin and thick walls, separated by a dense stroma contain-



FIG. 28

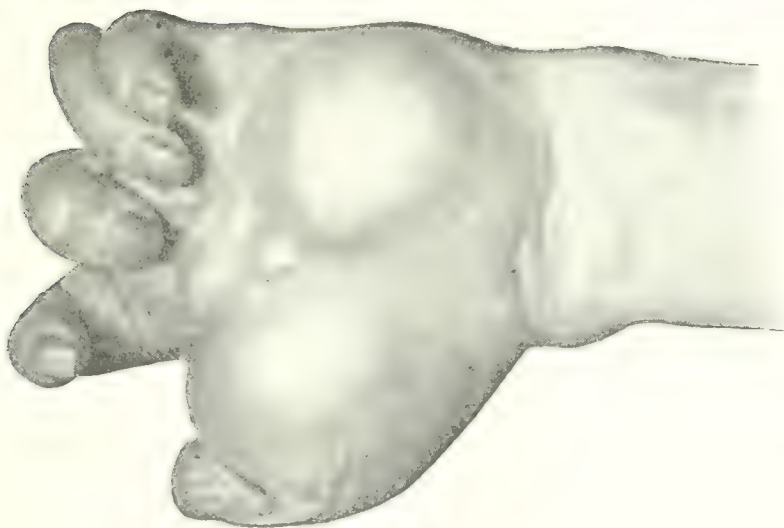


FIG. 29

ing spindle and giant cells, extravasated blood, and blood pigment. In the illustration he shows the giant cell lying in a spindle-cell stroma. It is my impression that these two cases are the same. His second case (Fig. 29) is even more interesting than the first, chiefly on account of the

¹ PROGRESSIVE MEDICINE, December, 1903, Fig. 17.

diffuseness of the growth. The masses, like a *lipoma arborescens*, involved the flexor tendon sheaths of the forearm, wrist, and hand. The picture taken at operation (Fig. 30) gives a fair idea of the peculiar appearance and diffuse involvement. Histologically, the tumor was like that in the first case, except the stroma was more cellular.

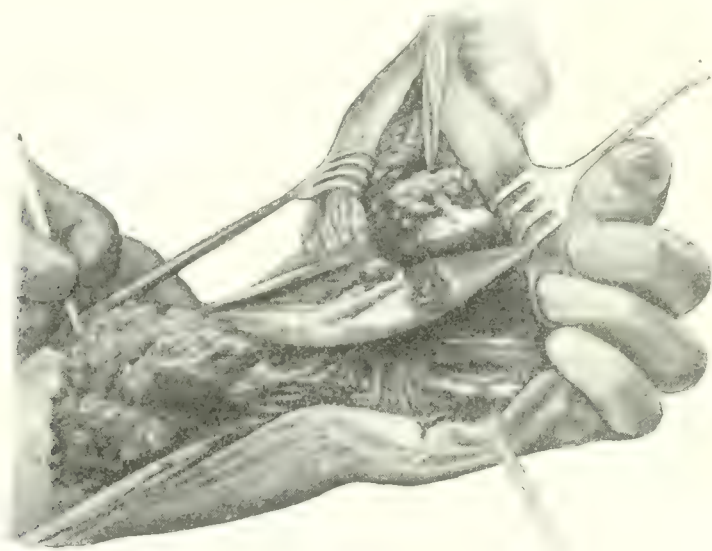


FIG. 30

Finger Tumors. In *PROGRESSIVE MEDICINE*, December, 1905, I discussed all the finger tumors, the majority of which arise from the tendon sheaths. I discussed lipoma, ganglion, encysted foreign bodies, fibrosarcoma, or fibroma including the giant-cell tumor, and subungual perithelioma. I have also observed and reported in *PROGRESSIVE MEDICINE*, December, 1903, p. 56, a fibro-angioma of the thenar prominence of the thumb. This case resembles Fritsch's second case in its relation to trauma. Fritsch's patient was seventy-three, and there was a history of trauma twenty years before, from which the patient never fully recovered; the marked swelling shown in Fig. 29 was of but six months' duration. In my case the patient was thirty, the trauma had taken place fifteen years before observation, and the tumor followed three years after the trauma.

It is quite possible that Fritsch's two cases may be the giant-cell fibrosarcoma or fibroma, but they impress me as fibro-angioma. It is interesting to note that in Fritsch's first case, on the opposite ankle, there was a tendon-sheath tumor which proved to be a hygroma or ganglion, and its relation to the tendon sheath, first described by Billroth as a hernia of the tendon sheath, could be demonstrated.¹ Coenen,² in his report on the tumors treated in the dispensary of the Royal University Clinic in Berlin during the year 1903-1904, describes six cases of fibrosarcoma of the tendon sheaths which Fritsch looks upon as of

¹ *PROGRESSIVE MEDICINE*, December, 1907, p. 210.

² *Archiv f. klinische Chirurgie*, 1906, vol. lxxviii, p. 677.

similar pathology to his own, except that the tumors were all encapsulated and not diffuse. It is the diffuseness of Fritsch's tumors that inclines me to the diagnosis of a fibro-angioma with foreign body giant cells. For practical purposes it makes very little difference. What I wish to emphasize is that these tumors are benign, or, at least, if they are sarcoma, they can be cured by local excision, and mutilating operations need not be performed.

Fibromyxoma of Nerve Sheaths. This multiple congenital lesion, also known as *von Recklinghausen's disease* or *multiple neurofibromatosis*, may present itself to the surgeon for treatment on account of the unusual local growth of one of the tumors which may be benign or malignant.

Kenneth A. J. MacKenzie,¹ before the American Surgical Association, presented a patient from whom he had removed a large tumor involving the sciatic nerve.

This case is of unusual interest to me, because through the courtesy of Dr. MacKenzie I was able to study the tumor. The case is of general interest from the standpoint of an extensive neuroplasty after a very large resection of the sciatic nerve. The patient was a male, aged forty-five; the multiple tumors were not observed until twenty years ago, and presented the usual picture of von Recklinghausen's disease. The growth in the individual tumors was slow. Ten years ago one of the tumors was removed from a position above the inner condyle, probably from the ulnar nerve. The tumor operated on by Dr. MacKenzie made itself known by a swelling in the middle third of the posterior portion of the thigh about seven months before the patient came under Dr. MacKenzie's care. At once this swelling became different from the other tumors—it was painful and tender. Rather unusual in my experience, this sensitiveness disappeared, to return again after a trauma, after which growth and pain increased; the pain was intense, extended over the swelling and referred down the limb, and there was definite loss of muscular power.

The position of the tumor, the part resected and the method of covering the defect with a plastic operation on the branches, is shown in Fig. 31. The result of the operation has been an unusually good one: the patient walks without crutches, but sensation is not fully restored. This is not the place to discuss the interesting observations and especially the work of Head on the return of sensation after nerve suture, but all these details were worked out in this case. Microscopically, this tumor which involves the sheath of the sciatic nerve, and which has grown around the nerve fibers, has become a spindle-cell sarcoma. I was especially interested in the sections above and below this tumor, because we could make out in them the congenital *Anlage* from which

¹ Annals of Surgery, July, 1909, vol. I, p. 293; Surgery, Gynecology, and Obstetrics, July, 1909, vol. ix, p. 30.

all of these tumors originated. The loss of power in some of the muscles below the tumor is demonstrated histologically by the evidence of pressure and nerve atrophy.

Francis Harbitz,¹ of Christiania, Norway, contributes a very complete and fully illustrated article on multiple fibroneuromatosis. He calls attention to the fact that spontaneous recovery may take place.



FIG. 31.—Diagram to show the position of the tumor, the part resected, and the method of division of the internal and external popliteal nerve; also the scheme of suture. (Sketch by Miss S. Hayes.)

Malignant Tumors of Nerve Sheaths. The opportunity to study pathologically MacKenzie's case suggested that it would be worth while to review the other malignant tumors of nerve sheaths which I have studied from time to time in the surgical pathological laboratory. There are five cases. One represents the border-line tumor between a fibromyxoma and a fibromyxosarcoma. In this case the tumor was attached to the

¹ Archives of Internal Medicine, February 15, 1909, vol. iii, p. 32.

sheath of the sciatic nerve in the popliteal space. In the second case the tumor situated in the pelvis was mixed with other tissues, and must be looked upon as a teratoma. The other cases are distinctly sarcoma. Two of these belong to the group of simple sarcoma and are composed of spindle cells mixed with fibrous and myxomatous tissue. They therefore resemble the case observed by MacKenzie. In one the growth was situated in the popliteal space; in the other it grew in the pelvis, as did the teratoma. The third case is a lymphoid-cell or small round-cell sarcoma. This tumor had somewhat the same relation to the sciatic nerve as the one reported by MacKenzie.

As to prognosis, two cases are apparently well; one was inoperable (the pelvic teratoma), one died of local recurrence and metastasis. The result in the fifth case is doubtful.

The case in which there is no doubt as to local recurrence and internal metastasis is the small round-cell sarcoma—a result one would have expected from the character of the tumor. The two cured cases, one situated in the pelvis and the other in the popliteal space, belonged to a variety of sarcoma somewhat similar to MacKenzie's case, in which the probability of a permanent cure is relatively large.

These cases have been discussed in *PROGRESSIVE MEDICINE*, December, 1903, p. 172; December, 1905, p. 271; and December, 1907, p. 214. They may be briefly described as follows:

CASE I.—(Path. No. 3981.) Fibromyxoma; very cellular tumor suspicious of sarcoma, arising from the sheath of the sciatic nerve in the popliteal space. The patient was a male, aged forty-two years, the tumor of six years' duration. The encapsulated tumor was removed by Halsted without injury to the sciatic nerve. The patient's wife writes that there was a local recurrence and pleurisy with effusion. The physician writes that he died of tuberculosis.

From a large experience with tumors of this kind I am somewhat surprised at the result, but since the man was forty-two years of age and had no evidence of tuberculosis, it seems probable that death was caused by the recurrence of the primary tumor.

The tumor was very large and distinctly encapsulated. It measured 24 by 13 by 13 cm. On section the greater part of the tumor could be separated into irregular masses and resembled a large intracanalicular myxoma of the breast. In some of the splits there was a collection of fluid; in other places, especially near the posterior capsule, the tumor was firm, homogeneous, friable, and resembled a cellular sarcoma. Microscopically, the greater portion of the tumor is a pure myxoma; there are distinct areas of cartilage and fibromyxomatous areas. So far the greater portion of the tumor is histologically benign, but the part shown in the gross is more cellular; the type of the cell is round; the picture here only differs from the areas of pure myxoma in the presence of a greater number of cells.

From my experience with intracanalicular myxoma of the breast and myxoma of the groin, I think it is justifiable to look upon these cellular areas as evidence of the beginning development of sarcoma. However, this picture is not the one usually found in cases which later develop internal metastases. Myxomatous tumors frequently recur locally, but many of these cases have been permanently cured by repeated local operations. Hence local recurrence is not a positive sign of sarcoma.

This case, therefore, must be looked upon as one of a border-line tumor, and whether the patient really died of metastasis, I fear, will never be settled.

CASE II.—The relation of this tumor to the popliteal space was different from that in Case I. It encircled the internal popliteal nerve, and, therefore, somewhat resembled MacKenzie's case. Histologically, it is a small round-cell sarcoma. The round cells appear in groups in a fibromyxomatous stroma. When the cellular elements are washed out the remaining tissue has the appearance of the benign fibromyxoma of nerve sheath. This patient died of local recurrence and internal metastases about five years after the first operation, and, as the symptoms of the tumor had been present one year, the duration of the disease was six years.

Another very interesting fact which must be borne in mind when making a prognosis in tumors of this kind, is that the free interval may be three or four years. In this case the first local recurrence took place seven months after resection of the tumor; then the limb was amputated, and the patient remained free from all symptoms for at least four years.

The symptom of onset in this case suggested a newgrowth involving the nerve trunk. The patient, a white girl, aged twenty-three years, had observed tingling and numbness in the left foot. At first these sensations were only felt when the leg was extended, later they were present all the time. Then the sensations changed to burning and itching. The patient was treated first for frostbite, then for flat foot. After six months there was a tender point in the popliteal space, and five months before admission weakness in the muscles was observed.

At the examination Dr. Cushing noted edema of the leg and foot below the knee, and a tumor in the popliteal space on deep palpation. The tumor was tender. There were definite changes in sensation and loss of motion, indicating undoubtedly involvement of the internal popliteal nerve. In Case I there were absolutely no symptoms of pressure on, or involvement of, the nerve.

I saw this case with Dr. Cushing in August, 1902. In view of the encapsulation it was quite apparent that the tumor could be removed by resection as completely as by amputation. No attempt was made at nerve suture. In the gross the tumor was distinctly encapsulated, much smaller than in Case I—10 by 6 cm. The capsule seemed to correspond to the

sheath of the nerve, which was spread out on the tumor very much like in MacKenzie's case, although the growth in this case was larger. On palpation the tumor was soft and fluctuating in some spots, in others hard and nodular. The capsule was thin, and when torn there exuded from the soft areas a dark, grumous material often seen in the necrotic portions of a very cellular sarcoma. The hard nodules show a fibrous stroma containing little spaces filled with the same soft, grumous material just mentioned. The tumor, therefore, has the appearance of an alveolar sarcoma. In places there is very little stroma, in others the stroma is excessive. Apparently nerve fibers are involved by pressure chiefly.

The histology of the tumor has been described. The patient returned within eight months. She had been walking with an apparatus. Signs of recurrence had been present only a short time. The first symptom was edema of the leg, then a palpable mass in the upper angle of the popliteal space. At the exploratory incision there was local recurrence in the muscles and a number of nodular growths in the stump of the sciatic nerve. Amputation was performed below the trochanter with excision of the sciatic nerve as high as possible. This was part of a mass almost as large as the original tumor and measured 10 by 5 cm. There were other nodules in the muscles above and on the nerve itself. Histologically, the tumor resembles the primary, except it is more cellular. The patient remained free from recurrence four years, when she began to suffer with pain in the stump. There was evidence of recurrence in the stump and metastasis to the iliac glands. The last few weeks of the patient's life were passed under the influence of huge doses of morphine for the relief of pain. At the autopsy, in addition to the local recurrence, which had extended by direct continuity into the iliac glands, tumor nodules were found in the liver.

This observation demonstrates that the most malignant form of sarcoma may arise from the nerve sheaths. The type of the cell in this case resembles the lymphoid cell present in myxomatous tissues and tumors.

CASE III.—In this observation the pelvic tumor must be looked upon as a teratoma. It apparently originated from the sheath of the sciatic nerve, and, histologically, the greater part of the tissue resembled the fibromyxomatous portion of the tumor in Case I. I examined this female child three months after birth, and the mother informed me that within a short time of its birth, in fact, at the first examination, she found a hard lump in the right ischiorectal fossa. Within three weeks the skin over the lump became red and tender. However, the inflammation subsided, but the tumor continued to grow. At my examination I could see and feel a bulging mass to the right of the anus. It was tense and gave the sensation of fluctuation. Per rectum, the same tense, fluctuating tumor could be felt in the pelvis. The child was in good health, there was no evidence of metastasis, and it seemed to me

justifiable to, at least, explore. Of course, the majority of tumors at this age and of this size in the region of the sacrum are teratomata, but they are often benign and curable. Ten years ago I removed such a growth from a woman, aged twenty years, and there has been no recurrence.

After incising the skin and subcutaneous fat I exposed a distinct capsule. On opening it there exuded a clear, yellow, serous fluid, then a little hemorrhagic fluid; in addition, in the cavity there was a soft, lobular tumor attached to the capsule at one point by a pedicle. This intracystic tumor was removed without difficulty. For a benign tumor this would have been sufficient, but I could feel, further in the pelvis, another tumor. This was distinctly inoperable. At autopsy a similar mass was found within the pelvis. In the gross the tumor was filled with little cavities and cysts, which, under the microscope, are lined with epithelium and glands of the alimentary canal, and there are also areas of cartilage.

CASE IV.—This case is of great interest, because the tumor situated in the ischiorectal fossa, somewhat similar to the tumor in Case III, was removed with the curette by Finney six years ago, and there has been no recurrence. Histologically, it is a sarcoma. The tumor is not quite as cellular as in MacKenzie's case, but distinctly more so than in Case I. It is very friable, like in Case I. This patient was a white female, aged twenty-one years. The symptom of onset was pain referred to the coccyx. During the first two years this pain was intermittent in character; during the last six months it has been almost continuous. No tumor could be seen or felt until the examination per rectum under ether. An incision was made from sacrum to anus, the coccyx was removed, and the tumor exposed in the perirectal space. Finney informs me that there has been no recurrence. The histological picture is so nearly identical with that in the next case that I shall not reproduce it here.

CASE V.—Macroscopically and microscopically, this tumor resembles that in Case IV. Both are distinctly myxomatous, with cellular sarcomatous areas which are rather more cellular than in Case I, but less so than in MacKenzie's case. This case has been referred to in *PROGRESSIVE MEDICINE*, December, 1905, p. 272, with a colored illustration of its gross appearance (Plate IV, Fig. 2).

I had the opportunity to see this patient with Dr. Halsted, in March, 1905. The tumor was so large that at the exploratory incision it seemed probable that the local extirpation would require ligation of the popliteal artery and vein and, perhaps, division of the nerve. This proved correct at the examination of the extremity after amputation in the middle third of the thigh. The patient was a white female, aged thirty-six years. The symptom of onset, although the tumor had the same position in the popliteal space as in Case II, was different, the pain being referred

to the knee. There were no sensory disturbances in the foot and no loss of motor power. (Pathologically, the tumor did not involve the nerve, as in Case II.) On account of the local pain, the patient had been treated for arthritis of the knee. For over three years no tumor could be felt; then, eleven months before she sought Dr. Halsted's advice, a small tumor was noticed in the popliteal space. With the appearance of the tumor the pain disappeared. The tumor gradually grew in size. There have been three exploratory incisions; the last, six weeks ago, has left a suppurating sinus lined by necrotic and granulation tissue.

Lipoma. I have discussed the interesting osteoperiosteal lipoma,¹ the typical joint lipoma, and lipoma arborescens,² and most recently the intermuscular lipomas of the extremity.³

Werner,⁴ in reporting two cases, calls attention to the congenital lipomas and tail-like formations in the sacral region in man. They must be differentiated from the various forms of spina bifida and the teratomas. In the operative treatment there may be a distinct defect in the vertebræ, and in removing the lipomas one may open a small sack-like projection of the dural covering of the cord. I observed this in a case referred to me by Dr. Sandrock, of Baltimore. In this instance the tail formation projected from the last lumbar vertebra, and was about the size of a man's thumb.

The most interesting communication, however, and one which has been of the most practical importance to me in the microscopic study of tumors and inflammations, is the very painstaking microscopic investigation of the cells in granulation tissue of human fat issue by von Verebely.⁵

His material consisted of hernia and laparotomy wounds, amputations, wounds following the removal of tumors, etc.—147 cases arranged in a chronological series. The granulation of fat at certain stages—twenty-four hours, three, five, seven, ten, thirteen, seventeen days, three and five weeks—is described in great detail.

Macroscopically, there is scarcely any change for forty-eight hours, except, possibly, that the fat becomes slightly drier and paler. Beginning with the third day, it becomes impregnated with serum, the individual lobules stand out well between the connective-tissue septa; they seem more transparent, causing the fat drops to be less sharply circumscribed and separated. On the fifth day a delicate, veil-like exudate is formed which gradually becomes thicker, hiding the fat lobules. This exudate is at first pale, contains no vessels, and is easily rubbed off. Later it becomes light red in color, vascular and finely granular, and

¹ PROGRESSIVE MEDICINE, December, 1906, p. 224.

² Ibid., December, 1899, p. 213, and December, 1900, p. 205.

³ Ibid., December, 1907, p. 215.

⁴ Virchow's Archiv, 1908, vol. cxcii, p. 109.

⁵ Beiträge zur klinischen Chirurgie, 1907, vol. liv, p. 320.

attaches to the underlying tissue. Fat granulation is completed on the ninth to tenth day. From the superficial layers grayish-red strands extend into the fat tissue. This fat appears more dense, suggesting that the strands of normal tissue have thickened. Individual fat drops, which can easily be seen with a small lens, have become smaller, but are still sharply outlined. After the thirteenth to fourteenth day the soft, vascular granulations change in the deeper layers to a denser, paler scar tissue, causing a gradual retraction of the connective tissue.

Microscopically, there are two processes, one occurring between the fat cells and identical with the usual granulation of connective tissue, that is, round cells, fibroblasts, vessel budding of the same origin and course as in other connective-tissue granulations, the fat tissue being merely a sort of foreign body, very porous, however, which is susceptible to organization. On the other hand, there is a special process which affects the fat cells themselves, in the sense that they possess certain reactive possibilities, and that granulation cells generally offer certain modifications due to the presence of fat.

There are several processes at work: (*a*) Disintegration of fat cells and invasion of lymphocytes and leukocytes; the protoplasm of these cells becomes foam-like, due to the absorption of fat drops; the fat cells are necrotic. (*b*) Serous atrophy: while the fat cell retains its original shape and size, the space occupied by the fat is filled by a watery, clear fluid; these serous vesicles may remain quite long without any changes of the protoplasm or nucleus. It is, probably, a manifestation of impaired vitality of the fat cells, and leads finally to the disintegration of the cells in question, or to one of the following types: (*c*) Simple atrophy, in which the fat cell, while retaining its morphological and chemical properties, simply decreases in size; the fat is either assimilated by the cell, or it is made to disappear from some other cause, leaving the cell shrunken. This change is a permanent one. (*d*) Active changes in the protoplasm of the fat cell which lead to the disappearance of fat and the formation of round, pale cells with a large nucleus resembling the plasma cells of Waldeyer in fetal fat. In all stages of the anaplastic process some mitoses were found, signifying that we are dealing with a reawakening to new life and not merely a manifestation. As there are no traces of division of the protoplasm, the mitoses would seem to serve the formation of giant cells, which are met with in variable numbers and shape in granulating fat tissue. Many stages are noted between fat cells and these giant cells, showing gradual increase of the protoplasm surrounding the fat drop, which becomes small, the nucleus becomes pale, round or oval, enlarged, finally mitosis, and polynuclear giant cells with a remnant of fat somewhere in the protoplasm. This protoplasm stains only faintly, is finely or coarsely granular. These cells are difficult to differentiate from the elements of small-cell infiltration, with which they finally mix, more especially from two forms of entirely different prominence, namely,

those to be described under (c) and, in the later stages of granulation, from those cells which certainly mark the beginning of fatty infiltration. The entire process begins on the fourth to fifth day of granulation in the layers between the superficially inflamed and the deeper unchanged layer. (e) Proliferation atrophy of Flemming. At a certain stage of granulation there appear within the fat cells, large round cells with pale, vacuolized, foam-like protoplasm, with nucleus either vesicular, large, pale, with one to two vacuoles, or dark and almost structureless. Most of these cells have a single nucleus, but in later stages of granulation cells with from two to ten nuclei are found. They are seen singly or in groups of several surrounding a fat cell, or quite a number within a fat drop. They spread in the course of granulation to the intercellular spaces, where they remain easily recognizable owing to their peculiar morphology. Through this confluence with the intercellular elements, islands form which consist exclusively of such foamy cells. Later the intercellular elements become more scanty, so that with the third week of granulation, when the inflammation has subsided, the intracellular forms only remain and persist as long as the sixth week.

There are various views as to their origin; v. Verebely believes them to be derived from mononuclear white blood corpuscles.

All these types of cells may be so much alike that the derivation, life, history, and future of a single cell in an individual section cannot be traced with any certainty.

Bone Tumors. In discussing the paper by W. B. Coley, of New York, which was presented before the Surgical Section of the American Medical Association, I made the following remarks, which have been published:

"I cannot agree with some of the conclusions just made by Dr. Coley. One of these is in regard to giant-cell sarcoma.

"I am of the opinion that *giant-cell sarcoma* is relatively one of the least malignant of sarcomas of bone, and Dr. Coley should not include such tumors in the percentage of cures with his serum. In the surgical pathological laboratory I have records of sixteen cases of medullary giant-cell sarcoma of bone. All of these cases are well today, twelve years since the operation on the oldest case. In none of these cases was any serum employed. The operations have varied from curetting to amputation. During the same time I have observed three cases of periosteal giant-cell sarcoma, one situated around the ulna, two near the head of the tibia. These patients have remained free from recurrence from eight to twelve years. To these nineteen cases of giant-cell sarcoma of the long pipe bones, I may be permitted to add about twenty cases of giant-cell sarcoma of the upper and lower jaws, which have also remained well since their removal. In addition, with the assistance of Mr. Schapiro, I have failed to find in the literature a single case of pure giant-cell sarcoma which had given metastasis, but there are recorded cures even after two or more operations for recurrences.

"The case of medullary giant-cell sarcoma for which I operated in December, 1902,¹ has remained free from recurrence to this day, six and one-half years.

"The giant-cell sarcoma should not be included in any group of cases in which, in addition to operative measures, other treatment, such as with Coley's serum, or the x -rays, has been employed. Cures can be accomplished in this group by the most conservative means, without the aid of any sera or x -rays.

"The other forms of the less malignant sarcomas of bone are relatively less frequent than the giant-cell sarcoma. For example, I have observed but eight cases as compared with nineteen of giant-cell sarcomas of the long pipe bones. To this less malignant group belong the periosteal osteosarcoma (three cases, two cured), the chondromyxosarcoma (four cases, two cured), and the periosteal fibrosarcoma—a recent case.

"But if we include tumors of this variety originating in the upper or lower jaw, we can increase the number of osteo-, myxo- and fibrosarcomas by about ten cases, all of which have remained well, except two who died from postoperative complications.

"However, when we compare the results in the treatment of the more malignant periosteal and medullary sarcoma, with and without the use of Coley's serum, we find a great difference. In my own experience, and in the literature, no one has ever accomplished a number of cures of the round and spindle-cell sarcoma equal to that of Dr. Coley.

"In view of Dr. Coley's experience, I feel that his method of treatment should be tried in all these more malignant sarcomas, so that we may quickly accumulate a large experience from numerous sources. An observation like Dr. Coley's should receive confirmation.

"In regard to Dr. Coley's statement, that a low amputation should be performed rather than a high one, when the serum is employed in addition to operation, I would go farther. Amputation is only indicated when the complete excision of the tumor would leave a limb without function. It is the extent of the local growth that justifies amputation.

"It is a rather remarkable and suggestive observation which has been commented upon by many writers, that among the cured cases of the more malignant forms of sarcoma of bone there are about as many resections as amputations. In sarcoma of bone, death is due to metastasis, not to local recurrence.

"With regard to the question of exploratory incision, I do not see how it can be answered in more than one way: we must explore all early, doubtful bone lesions. It would be unjustifiable to amputate or resect without first ascertaining the nature of the lesion by an exploratory incision. For this reason, surgeons who assume the responsibility should educate themselves to recognize the nature of the different

¹ Johns Hopkins Hospital Bulletin, May, 1903, vol. xiv, p. 133.

surgical diseases from either the gross appearance of the tissues, or a rapid frozen section. The surgeon must be his own pathologist, just as it is being demonstrated that in surgery of the chest he must be his own physiologist."

In my contributions to the December numbers of *PROGRESSIVE MEDICINE* since 1899, I have attempted to present all the available literature on bone tumors. Further experience emphasizes more and more the view taken that conservative treatment is justifiable.

Brewitt,¹ before a meeting of the Berlin Surgical Society, reported a case of medullary round-cell sarcoma, containing giant cells, of the upper end of the tibia, which remained well three years after resection. There was 10 cm. shortening. In the discussion Koerte reported an apparent cure three or more years after a continuity resection of the femur for spindle-cell sarcoma.

Dollinger² reports a case of chondrosarcoma of the humerus apparently well four years after operation. The details of the pathology are not given in the review. The patient was a male, aged fifty-four years, and at the first operation the upper half of the humerus with its head was removed.

A month and a half ago, that is, after a free interval of almost four years, the remaining portion of the humerus was resected for recurrence. In spite of this, the patient has good function of the forearm; there is thirty degrees of motion at the elbow and complete pronation and supination. I have mentioned in previous numbers of *PROGRESSIVE MEDICINE* that in pure myxoma and myxosarcoma, recurrences after a long interval of time are frequently recorded, and permanent cures are observed after two or more local operations.

In the case reported and pictured in *PROGRESSIVE MEDICINE*, December, 1906, p. 222, Fig. 19, there was first an operation for local recurrence in one year, and at this operation most of the humerus was removed subperiosteally; it completely reformed with good function of the arm; a year later there was a small recurrence in the skin scar, and now there has been a three-year period without any evidence of a recurrence.

Lilienthal³ records a round-cell sarcoma of the humerus in which the tumor involved the upper half. Resection was performed in January, 1907. Dr. Lilienthal writes me under date of July 17, 1909, that the patient is well, now two years and six months since operation. Lilienthal was of the opinion that sarcomatous tissue was left behind. This patient refused amputation. It is very interesting to note that Coley's serum was employed. The report of the pathologist was a round-cell sarcoma. It is cases like this that influence me in recommending a trial of Coley's fluid in the treatment of sarcoma.

¹ *Centralblatt f. Chirurgie*, 1900, vol. xxxiv, p. 667.

² *Ibid.*, 1909, vol. xxxvi, p. 28.

³ *Annals of Surgery*, 1908, vol. xlvii, p. 786.

Doberauer¹ reports a successful resection of the upper third of the tibia for a medullary sarcoma. The defect was filled with an osteoplastic flap from the patella. There was no recurrence seven months after operation. This tumor was a giant-cell sarcoma. I cannot agree with Doberauer when he rejects curetting for giant-cell sarcoma. My own case was similar to this one reported; apparently it was more extensive. There has been no recurrence after curetting, now six years since the operation.

Ellsworth Eliot, Jr.,² describes a very interesting tumor which he calls a fibro-osteoma; it was situated on the anterior and inner aspect of the right humerus. The patient was a white boy, aged ten years; there was a definite history of trauma six weeks before. There was a hard fusiform mass, about 2 by 3 inches, attached to the upper end of the humerus. The tumor could be removed from the shaft of the bone by a chisel. This tumor consisted of a bony shell and a fibrous centre. It interested me, because this year Dr. George Ben Johnston, of Richmond, sent me a tumor similar in position to this one, which I looked upon as an exostosis of traumatic origin. As Dr. Eliot reported his case in 1908 and operated in 1900, it is fair to assume that there has been no recurrence.

There is an additional interesting point in this case—one first brought out by von Mikulicz, that is, that if amputation is suggested in these early cases, the patient will refuse, perhaps, to be operated on at all. It was this that urged von Mikulicz to be conservative. Dr. Eliot suggested to his patient that an amputation might be necessary; the patient consented to operation, but not to amputation.

Ostitis Deformans (Paget's Disease). Ernest von Kutscha,³ in reporting, in detail, three cases observed in the surgical clinic of von Eiselsberg, in Vienna, gives a very interesting summary of the clinical picture, which, however, adds very little, as he states, to the clinical picture, now classical, as left by Paget in his first publication, in 1876. In this contribution one will find about forty references to the literature and a very good discussion of the differential diagnosis. It is natural that it should discuss the possible etiological relation between this progressive disease of bone and the ductless glands. There is no proof at present that ostitis deformans is either the result of hyposecretion or hypersecretion of the pituitary body, although we now know that acromegalia and some forms of gigantism are so.

In the very early stage, when a single tibia is involved, in some cases associated with pain, in others not, the differential diagnosis from luetic periostitis or some other form of inflammatory bone lesion is more difficult than later. Never in the course of this disease is the

¹ *Präger medicinische Wochenschrift*, 1907, No. 10.

² *Annals of Surgery*, 1908, vol. xlvii, p. 808.

³ *Archiv f. klinische Chirurgie*, 1909, vol. lxxxix, p. 759.

differentiation from a bone tumor difficult, although later in the disease primary single tumors may develop, and they should receive the same treatment now established for similar tumors in patients whose general skeleton is not the seat of any disease. Up to the present time no treatment has had any effect on osteitis deformans. Progressively more bones are affected, and the bone changes in the single involved bones increase. The principal gross changes are enlargement of bone and bending deformity. X-ray studies show that hyperostosis and eburnation go on side by side. In the *American Practice of Surgery*,¹ Roswell Park gives a short, but very good description of the later stages of osteitis deformans, while Nichols,² in a longer description, gives a very good note on the pathology and diagnosis.

It is to be hoped that in early cases x-ray studies and excision of small pieces of bone for microscopic examination will be made; that perhaps some of these cases can be collected in properly equipped clinics for studies in metabolism. In later cases every one should attempt to get autopsies. Osteitis deformans of Paget belongs to a group of surgical diseases such as arthritis deformans and others in which there is opportunity for investigation with the promise of valuable results.

Ulcers and Skin Grafting. Dr. John Staige Davis, of Baltimore, has given me the opportunity to look over his original manuscript, which is a study of 550 cases of skin transplantation at the Johns Hopkins Hospital, but, more important, this paper contains Dr. Davis' original work, which has enlarged the field and improved the technique of this operative procedure. This communication will be published soon in the *Johns Hopkins Hospital Reports* and in *Surgery, Gynecology, and Obstetrics*, and I shall leave until next year a more detailed review. A preliminary report has just appeared.³ In this paper Davis describes the technique of cutting grafts from the thigh, with very good illustrations, which I reproduce, because I think they are more descriptive than words (Figs. 32, 33, and 34).

Davis⁴ also contributes another excellent paper on the "Treatment of Ulcers and Granulating Surfaces with Scharlach R. (Scarlet R)." This publication is also well illustrated. I would advise all surgeons to refer to these two communications, as I am confident they will find points which will improve their technique and results.

LOCAL ANESTHESIA IN SKIN GRAFTING. I have had considerable experience in cutting skin grafts under cocaine anesthesia. For this reason I feel that I can recommend the new point of Gunnar Nystroem.⁵ It rests upon the anatomical point that the external cutaneous nerve (*nervus cutaneus fem. lateralis*) is very accessible to a perineural injection

¹ Bryant and Buck, vol. iii, p. 361.

² Keen's Surgery, vol. ii, p. 60.

³ Annals of Surgery, September, 1909, vol. i, p. 542.

⁴ Johns Hopkins Hospital Bulletin, June, 1909, vol. xx, p. 219.

⁵ Centralblatt f. Chirurgie, 1909, vol. xxxvi, p. 137.

just to the inner side and slightly below the anterior iliac spine (see Anatomy). When this nerve is infiltrated there is a large zone of anes-



FIG. 32



FIG. 33



FIG. 34

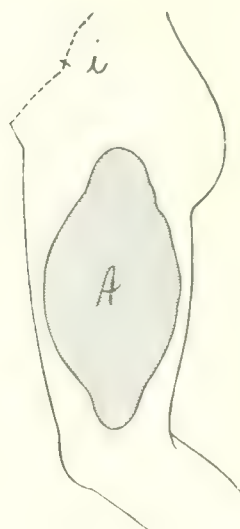


FIG. 35

thesia on the external lateral surface of the thigh (Fig. 35). Although I have not tried this method, it appeals to me as simple and efficacious.

GENITO-URINARY DISEASES.

BY WILLIAM T. BELFIELD, M.D.

Gonorrhea. Ruggles¹ discusses *congenital abnormalities of the penis* in their relation to gonorrhea. The para-urethral passages are numerous and often undiscovered because their openings may be minute and concealed by folds of mucous membrane. In these the gonococcus infection may persist indefinitely until ultimately discovered and arrested by injection. One of his patients presented two supernumerary canals above the urethra: one was one and one-fourth inches, the other one-half inch in depth, each having the caliber of a darning needle. Each of these was infected with gonococci, and required treatment like that given to the urethra proper. Failure to discover these supernumerary canals and to combat their contained infections would doubtless have resulted in constant reinfections of the urethra.

Ruggles narrates some of the difficulties he has experienced in overcoming the infections of these canals with injections of silver salts. I have been in the habit of destroying not merely the infecting bacteria but also the epithelium lining the canal itself. Of the many agents available for this purpose, *lactic acid* diluted with an equal bulk of water and injected into the canal through a canaliculus needle whose point is carried to the bottom of the pocket is worthy of attention. In stubborn cases I have cautiously used the undiluted acid, which destroys the entire canal and possibly some surrounding tissue.

A case of *sycosis*, the infection due to an organism morphologically identical with the gonococcus, is reported by Wright.² Pustular folliculitis involving the bearded part of the face had existed for two years; the patient's barber was under treatment for gonorrhea at the time the infection was first noticed. Wright did not employ the means of exact identification required to establish a positive diagnosis, but refers to Cronquist's case of gonococcus infection of the hair follicles of the abdomen in a woman suffering from gonorrhea, as evidence that the hair follicles may offer a favorable soil for the gonococcus.

GONORRHEAL IRITIS is the subject of a suggestive article by Beaumont,³ who, as surgeon to the Eye Infirmary at Bath, has had exceptional opportunities for observing the ocular lesions associated with all forms

¹ Medical Record, January 9, 1909.

² Journal American Medical Association, June 19, 1909.

³ Brit. Med. Jour., May 5, 1909.

of so-called rheumatism. After twenty years of such experience, he expresses skepticism as to the existence of gouty iritis; declares his belief that rheumatic iritis is a rarity; and is impressed with the idea that most of the cases of iritis usually ascribed to gout and rheumatism are really due to gonorrhea. "The more I see of rheumatic iritis the less I see of it." The many cases so labelled that come to Bath are comparatively young men of otherwise good health, who complain of recurrent attacks of joint disease ("rheumatism") in the lower limbs, and who confess to gonorrhea prior to the beginning of the rheumatism and eye troubles. Beaumont reviews the twenty cases of iritis in patients admitted to a Bath hospital because of gout, rheumatism, or rheumatoid arthritis. There were eighteen men and two women; all were under forty-two years of age, and nearly all had contracted gonorrhea prior to the beginning of their rheumatic troubles. He quotes approvingly the opinions of other ophthalmologists who consider gonorrheal iritis far more common than gouty or rheumatic inflammation of the iris.

There has as yet been no exact determination of the relation of the gonococcus to iritis; and this chapter needs revision. While the demonstration of the gonococcus in the suspected tissue is not always feasible, yet the reaction of this tissue and of the entire body to the gonococcus vaccines is always practicable. (See *PROGRESSIVE MEDICINE*, December, 1908, pp. 225 to 227.) Moreover the efficacy of gonococcus vaccines and sera in relieving the pain of gonorrheal arthritis is now so well established that it has become a valuable means of differential diagnosis between arthritis of gonococcus and of other origins, and could be employed to determine the cause of the joint affections associated with iritis. Until some evidence of this sort is furnished, the relation of gonorrhea to tardy iritis must remain a matter of speculation.

GNOCOCCLUS SEPTICEMIA. Dieulafoy¹ is impressed by recent experiences with the frequency of general infection by the gonococcus; in one of his cases, fatal within a week, the symptoms closely simulated typhoid fever. In two other cases the patients were recovering from gonococcus septicemia (the organisms having been demonstrated in the blood) when typhoid fever developed. He quotes Barbiani's report of a case that was clinically acute articular rheumatism, the blood, however, showing numerous gonococci. Dieulafoy inclines to the belief that the gonococcus is the cause of many cases of general and local infection in which its presence is not suspected or discovered.

There can be no doubt that the remote lesions induced by the gonococcus are far more frequent than their detection. The still prevalent tendency to regard gonorrhea solely as the result of illicit cohabitation, and therefore impossible in those guiltless of such practices, masks the prevalence of this infection in children especially.

¹ *Presse médicale*, May 19, 1909.

In a case recently observed, polyarticular lesions with high fever in a girl aged six years would doubtless have been considered acute articular rheumatism if a gonococcus vulvovaginitis had not been identified. The joint inflammations promptly subsided under the use of anti-gonococcus serum. It seems probable that the recognition of the frequency of remote gonorrheal lesions and the more general use of vaccines and sera as diagnostic measures would materially extend our clinical knowledge of the constitutional manifestations of gonorrhea.

Cases of so-called chronic rheumatism, including some in which the lesions have never been acute, have been promptly relieved by the antigonococcus serum; these may occur in women and children who have acquired the infection innocently. Apparently gonorrhea may ultimately be found, as syphilis has been, responsible for many chronic lesions remote in time and place from the original focus of infection.

The possibility of a *gonococcus infection without suppuration* was emphasized by Picker¹ at the meeting of the German Urological Society, with a report of such cases personally observed. In this respect, he states, the gonococcus is to be classed with the tubercle and typhoid bacilli, whose vital activity may or may not induce suppuration, according to the environment of the tissues invaded. Picker also refers to the swelling of inguinal glands and remote structures such as joints, which may occur within a few days after the infecting coitus and before urethral suppuration is discovered. He inclines to the idea that these remote lesions are due to the metastasis of the gonococcus, though they can be better explained as an intoxication rather than an infection.

GONOCOCCUS SERA AND VACCINES. The literature of the past year confirms the inferences drawn from earlier reports, as presented in the last volume of this review.² The great value of both sera and vaccines in gonorrheal lesions of serous membranes—gonorrheal rheumatism, so-called—is confirmed by additional testimony; while the failure of both definitely to improve the gonococcus infections of mucous membranes seems supported by further experience. To this rule there are a few exceptions; thus Butler and Long³ express the conviction “that in the treatment of gonorrhea in female children, gonococcus vaccine is more effective than local applications. The vaccine treatment is not only effective, but in many cases, more particularly those of some standing, produces very rapid improvement, and often recovery. This does not, however, hold good in all chronic cases, nor in all acute cases, many of which require a prolonged course of inoculations. This latter point should be held in mind by those undertaking this work.

“The most effective dosage of vaccine varies for different cases and at different times for the same case. This will be best determined by the

¹ Zeit. f. Urologie, Beiheft 1, August, 1909.

² PROGRESSIVE MEDICINE, December, 1908.

³ Journal American Medical Association, October 17, 1908.

patient's opsonic index to the gonococcus. We have found doses varying from 5,000,000 to 50,000,000 very satisfactory. Where inoculations are practised without the index in the quantities mentioned, they should be given every fifth or sixth day. Doses up to a hundred million may be used without causing any general reaction on the part of the patient, except in rare cases. The larger doses do not seem to have been more effective, on the immunity wave or clinical condition, than smaller doses.

"There seems to be no particular advantage in a vaccine made from several strains of gonococcus over that made from a single strain."

Churchill and Soper¹ conclude that "inoculation treatment of vulvovaginitis apparently shortens the stay of patients in the hospital. Whether or not it actually lessens the total duration of the disease, as compared with other methods of treatment, future investigations must determine.

"Old strains are more effective than fresh ones.

"It is desirable, though apparently not absolutely necessary, to take the index while pursuing the treatment.

"There is no correspondence between the index and the vaginal discharge."

Eyre and Stewart² contribute an unusually careful clinical and bacteriological study of the vaccine treatment in fifty-three cases of gonorrhea under opsonic control; their conclusions are more encouraging than those usually formulated. They maintain that smaller doses at shorter intervals than has been customary are both safer and more effective; the smaller doses serve the double purpose of raising and steadying the opsonic index; a steady index just above the normal they find to be the most favorable condition for rapid improvement. They advise that when the opsonic index cannot be frequently determined—and this includes practically all clinical work—injections of one million to two million gonococci every three to five days make a safe and efficient treatment. After the injection of five million the interval before the next injection should be five to seven days; after ten million, eight to ten days.

Their clinical results have been positive though not brilliant; they maintain that the average duration of the gonococcus infection proper is reduced, and that the remote foci of infection, notably in the epididymis and iris, are markedly controlled by these vaccines.

Herbst³ reports twenty-four additional cases of *gonorrheal arthritis*, with prompt relief in twenty, no improvement in the remaining four. In two of these latter, gonococci were demonstrated in the liquid withdrawn from the joint by aspiration, the other two refusing aspiration.

Herbst thinks that most failures and recurrences in the serum treatment of arthritis arise from (1) failure to remove the infection in the

¹ Journal American Medical Association, October 17, 1908.

² Lancet, July 10, 1909.

³ Illinois Medical Journal, June, 1909.

genital tract, and (2) insufficient dosage of the serum. The patient should receive 20, better 30, c.c. of the serum. He thinks that all joints affected with the toxemia only will be cured by this treatment; joints actually infected with the gonococcus may resist it.

Tuberculosis. Akerblom and Vernier¹ note the large percentage of albumin in the urine from tuberculous urinary passages without other disease of the kidneys. They consider the determination of the urea and chlorides important, and recommend a starch diet free from chlorides when renal retention is found.

For the detection of *tubercle bacilli in the urine* they recommend the Martin stain, because it is more searching than the usual stains and therefore reveals the bacilli when these escape the usual methods of detection. The Martin stain consists of two solutions: (1) A 1 per cent. solution of ammonium carbonate in distilled water; and (2) a 3 per cent. solution of crystal violet in 95 per cent. ethyl alcohol. Three parts of the first solution and one part of the second are mixed just before applying to the specimen to be examined.

Harris² formulates conclusions based upon his experience with *tuberculosis of the kidney*. He emphasizes the hematic source of the renal infection as distinguished from the older conception of an infection ascending from the lower urinary and genital passages. Since the bacilli commonly circulate in the blood and are found in the urine in most cases of active tuberculosis in the lungs or elsewhere, it follows that the renal lesions may be one or many tuberculous emboli, in one or both kidneys. Clinically renal tuberculosis is in most cases unilateral at the beginning—a fact of great clinical importance. Another most important clinical fact is the familiar observation that irritation of the bladder, miscalled cystitis, is a usual result of tuberculosis limited to the kidney. Hematuria and polyuria are early and frequent symptoms.

Early diagnosis of the tuberculous infection and determination of its presence in one or both kidneys are vital features in prognosis and treatment. Harris relates three personal cases in which, following the practice of Rovsing, Kümmell, and Israel, he removed a tuberculous kidney after determining the existence of the same infection in mild degree in the opposite kidney. The recovery of these patients not merely from the operation, but also from the infection in the second kidney, supports the assumption that the removal of the toxic material of the excised organ greatly lightens the burden of the organism, and gives the remaining kidney the benefit of a Bier's hyperemia.

His conclusions are thus summarized: "First, I urge a more thorough and systematic investigation of all patients presenting urinary symptoms in order to recognize tuberculosis of the kidney in its early stages. Secondly, I believe that bilateral involvement is not in itself a

¹ Therapeutische Monatshefte, April, 1909.

² Journal American Medical Association, May 15, 1909.

contra-indication to operation, but that in suitably selected cases, in which one organ is only slightly involved, the removal of the more extensively diseased kidney may be an aid to the recovery of the other. Thirdly, when a diagnosis has been made early, and the lesion is presumably slight, hygienic general and specific treatment should be given a fair trial before a resort is had to nephrectomy. Fourth, when an operation is undertaken it should be complete nephrectomy, if possible, as incomplete operations, such as nephrotomy, partial resections, etc., have not been followed by good results."

Fenwick¹ narrates the case of a woman, now thirty-six years old, in whom he detected an ulcer of the bladder near the right ureteral orifice eighteen years ago, and who now has "obsolesced" tubercle of that kidney and early tuberculosis of the opposite organ:

"I did not know then, as I do now, that this ulcer in the ureteric area generally indicates renal tuberculosis of the same side.

"Incidentally I may mention that I treated her with Koch's (old) tuberculin, and she improved, and I lost sight of her. An enthusiast might jump to the conclusion that the obsolesced condition to which this kidney tubercle has passed is due to the treatment by tuberculin. This is not so, I feel sure. Eighteen years' experience of tuberculin has proved to me it rarely 'cures' urinary tubercle. It generally reduces the absorptive toxicity of the debris and the caustic destructiveness of the urine. I have never published or taught that tuberculin was a *cure*, but I always use it if I can, because it is the most important therapeutic remedy we possess for allaying the bladder distress of early tubercle.

"Reading through these old notes, illuminated by the light of eighteen years' experience of cystoscopy, I realized that the right kidney had probably been tuberculous when I first saw the patient. But what was its condition now, for it was painless, and the urine contained but little pus. Had the ureter closed and the kidney become useless? This was the most probable explanation of the quiescence.

"To solve this problem I cystoscoped the patient last week and showed a scar on the right side of the posterior wall of the bladder, just where the ulcer had appeared eighteen years ago."

Fenwick removed the right kidney, the illustrations of the article showing "massive tuberculous degeneration" of that organ, and then outlines the treatment which he prescribes in the attempt to heal the tuberculous lesions of the remaining kidney as follows:

"There are three areas to repair.

"The renal pelvis, which is affected by the tubercle bacillus. This is done by graduated minute doses of Koch's new tuberculin. But that is not curative. A coincident attempt is made to wall in the destructive processes by lime, either by administering lime chloride or lactate—what

¹ British Medical Journal, July 3, 1909.

you will, as long as you imitate Nature's method of cure by giving lime, for I hold the profession are blindly chasing bacteria to root them out, and are forgetting to wall them in and render them innocuous.

"The structure of the kidney, especially the cortex, is also repaired by giving crushed kidney—a valuable medicine I have had in active employment for fifteen years, and the powers of which I am only just beginning to realize; and lastly, the general health is improved and nutrition aided by fresh air and the addition of sugars and fats to the diet.

"The wound healed rapidly, and the patient's last report (June 16, 1909) showed she was improving."

Phosphaturia is sometimes regarded as an early sign of tuberculosis. Campani maintains that it is merely a sign of debility, of hypo-acidity; that it is the effect of alimentary disturbances, of sexual neurosis, of a sedentary life, or excessive physical exercise. Hence its undoubted frequent association with early tuberculosis is brought about indirectly, not as a direct sequence of the tuberculous process.

Robin¹ presents further data supporting his conviction that demineralization of tissues is a potent factor in inviting tuberculous infection. While normal blood contains from eight and one-half to nine parts of inorganic matter per thousand, the blood in the pretuberculous and early tuberculous stages contains six and one-half to eight parts per thousand. Analysis of organs and bones from subjects of accidental deaths showed that the tuberculous tissues contain only two-thirds as much inorganic matter as the non-tuberculous. The excessive elimination of inorganic materials by the tuberculous is also recalled.

The practical inference from these data is the necessity for combating the gastric hyperchlorhydria which seems to promote this demineralization, and the wisdom of administering mineral elements in the diet and remedial agents.

Cabot² reports two cases which illustrate the value of the *X-ray* in renal diagnosis, aside from its ability to picture calculi. In one of these the ordinary methods of diagnosis—cystoscope and ureter catheter—could not be employed. A skiagram showed an extensively tuberculous kidney and ureter; these structures were removed and found to corroborate the picture. Cabot mentions another case in which the physical examination led to the diagnosis of an enlarged kidney; the *x-ray* plate showed the enlargement to consist of tuberculous glands around the kidney, this organ itself being of normal size. Operation proved the correctness of the plates.

In a third case a sinus persisting for years after the removal of a tuberculous kidney was shown by the *x-ray* to be maintained by a piece of the kidney which had escaped removal.

¹ Medicinische Klinik, April 18, 1909.

² Boston Medical and Surgical Journal, March 4, 1909.

Colon Bacillus Infection. That the colon bacillus is frequently the agent in infections of the urinary tract and of the seminal vesicles has long been established; and that it is a most persistent infection is also well known. The removal of the cause of disturbance sometimes fails to dislodge the organism, and large doses of urotropin and salol are equally ineffectual. Hence it would seem that colon bacillus infections should be an attractive field for vaccine therapy. While no extensive investigations of this subject seem to have been made, yet various reports of limited experiences have been recorded.

Rovsing¹ mentions twelve cases of *colon bacillus nephritis and pyelitis* treated with vaccines prepared after Wright's plan. Though quite skeptical as to the success of the method, he soon became convinced of its extreme value, most of his cases being promptly cured after standard measures had failed. He was also surprised at the mildness of the reactions, both local and general. The multiplication of the bacilli in the urine does not seem to be checked by the vaccines, even when the other symptoms are relieved; hence he advises irrigations of the bladder and the internal administration of 15 grains of salol three times daily; (though Wright advises that antiseptics should not be administered in conjunction with vaccine therapy, since the former may modify the action of the opsonins). Rovsing calls especial attention to one of his cases, in which the vaccine treatment was, in his opinion, a life-saving measure. This was an elderly woman who had had a colon bacillus infection of the urinary tract for several years, with recurrent acute nephritis, the last attack being a septicemia marked by coma. Under vaccine therapy the infection was eradicated.

Billings² reported to the Chicago Medical Society several cases of successful vaccine therapy of colon bacillus infections of the urinary tract. Two of these are especially noteworthy—cases of so-called essential renal hematuria, in one of which nephrotomy had been made without arresting the bleeding or discovering any local lesion in the kidney or its duct. Under the use of autogenous vaccines the bleeding was promptly and permanently checked in each instance. Billings expresses the conjecture that other cases of symptomless bleeding from the kidney may be due to the same infection and amenable to the same treatment.

My own observation covers several cases of colon bacillus infection of both urinary and seminal ducts successfully treated with vaccines, but it also includes an infection of the kidney and ureter in a physician consequent upon the presence of a calculus, in which, after the removal of the stone, the infection persisted in spite of the long-continued internal administration of urotropin and salol, and frequent irrigations of the

¹ Hospitalstidende, May 12, 1909; Journal Amer. Med. Assoc., July 24, 1909.

² Illinois Medical Journal, May, 1909.

renal pelvis through the ureter catheter. Finally, autogenous vaccines were made and injected under opsonic control by physicians experienced in such work, but without the slightest appreciable improvement in either subjective or objective symptoms. Upon the failure of smaller doses, the dosage was increased to 750,000,000 bacilli.

The very common association of the colon bacillus infection with tuberculosis of the urinary tract may lead to neglect of the latter, especially because the bacilli of tuberculosis may far more easily escape detection in the urine than can the colon bacillus. Two very valuable illustrations of this possibility are related by Cunningham.¹ In the first case purulent urine and frequent micturition persisted for months after the relief of a tight urethral stricture. The cystoscope and ureter catheter showed that the pus proceeded from both ureters. Colon but no tubercle bacilli were found. Autogenous vaccines were prepared and injected, with some slow improvement. The author thinks further investigation for tubercle bacilli is required, as illustrated in the second case. In this patient a colon bacillus infection of the right kidney was discovered and treated with autogenous vaccines. Although the urine cleared distinctly, the frequency of urination persisted and the patient's weight decreased. Though repeated examinations had failed to detect tubercle bacilli in the urine, the Pirquet cutaneous test was performed with a distinctly positive result. Minute injections of the new tuberculin (T. R.) were followed by immediate and distinct improvement in all symptoms, including the patient's weight. A guinea-pig inoculated with the urinary sediment before the tuberculin was used presented general miliary tuberculosis.

It is obvious that vaccine therapy is in its incipency, and that its value is not to be measured by these or any other results as yet obtained. Most of the observations heretofore reported have not included the opsonic control which Wright considers essential; many have been made with stock vaccines whose original potency may have been essentially modified by age; and much of this work has been done by clinicians without expert laboratory assistance. That the confusion and disappointment in results is attributable to imperfect methods and agents; that the principle underlying these attempts is of great therapeutic value, seems amply established by the undoubted successes often achieved through the use of the new tuberculin as well as autogenous vaccines against infections by the colon bacillus, staphylococcus varieties, streptococcus of erysipelas, and puerperal sepsis.

There seems but little room for doubt that with experience we shall achieve a notable advance in the therapy of conditions heretofore beyond medical aid; and that medicine will wrest from surgery the field of the infections.

¹ Boston Medical and Surgical Journal, March 18, 1909.

Kidney and Ureter. *Decapsulation of the kidney* is reviewed by Edebohls,¹ incidental to a summary of his own experience, which includes the performance of this operation upon 102 patients for the cure of chronic nephritis. These included 53 "survivors," who presented at the time of operation the following varieties of nephritis: chronic interstitial, chronic diffuse, and chronic parenchymatous. The first of these survivors was operated upon about fifteen years before the publication of this report, the last over one year. The subsequent history of 50 of these patients has been traced; of these 6 are classed as unimproved, 11 as improved, and the remaining 33 as cured. Only 29 of the entire 102 cases have died of chronic nephritis or its sequelæ, and none from the operation.

The cure of chronic nephritis is, in the author's opinion, only started by renal decapsulation, time being essential to obtain the full advantages of the operation; in some patients the health of the kidneys was restored in a few months after operation, while in others the same result was reached only after three years.

From his succinct summary, the following are extracts:

"Of 22 sufferers from chronic nephritis who came to me for operation, and whose deaths were immediately imminent by virtue of the disease, 12 were saved by operation, while in 10 the attempt to save life failed.

"Of the 39 remote deaths, none were due to operation. Twenty-nine of the 39 patients ultimately died of chronic nephritis or its complications. Of these, only 11 received no appreciable benefit from operation. The worst that can be charged against operation in these 11 cases is that the operation did no good; it certainly did no harm. Eighteen of the 29, as well as the 10 patients who finally died of causes other than chronic nephritis, were all more or less benefited by the operation, the duration of improvement experienced by these 28 patients amounting to a total of more than thirty-three years.

"Of the 11 patients who have all experienced decided improvement in general health and in the condition of the urine as the result of operation, a number appear to be on the high road to complete health, and bid fair later on to augment the list of cures.

"Finally we reach the 33 cures of chronic Bright's disease attained as a result of operation. These 33 cures alone would justify all the work that has been done, even if no benefit had accrued to the remainder of my patients. The justification, in my opinion, will still hold good, even if some of the cases now classed as cured should relapse, or in the future become the victims of a new nephritis.

"Of the entire 102 patients, therefore, 21 received no benefit from operation, while 81 patients experienced amelioration varying all the way from slight and temporary improvement to complete cure. In 12

¹ Journal American Medical Association, January 16, 1909.

cases the operation proved directly life-saving by rescuing the patient from impending death.

"In judging the above results, the fact should be borne in mind that the immense majority of my patients came for operation only after all other measures and treatment had failed to arrest the progress of their chronic nephritis. A great number were on the very eve of dissolution, and the desperate character of my series of 102 cases will probably not be duplicated by any surgeon in the future. Better results than those recorded here will undoubtedly be obtained as soon as sufferers from chronic nephritis seek relief and cure in early operation.

"In the meanwhile, these results—33 cures among 99 patients whose ultimate fate is known—obtained in a hitherto incurable malady, and one which, according to the United States census of 1900, ranks sixth in the list of diseases causing death, not alone justify the surgical treatment of chronic Bright's disease, but establish that treatment as at present the main if not the only hope of a very large class of sufferers.

"For the present, in view of the helplessness of medicine in the presence of established chronic Bright's disease, the advance in treatment represented by renal decapsulation should be welcomed by every physician called upon to treat chronic nephritis. Nor is the physician justified in taking the position that only after all other measures have failed will he resort to decapsulation. That is giving neither the operation nor his patient a fair chance, to which the latter at least is certainly entitled. For even at present I am able to affirm, as the result of experience, that renal decapsulation applied early in the course of a chronic nephritis, and in the absence of complications, is almost free from danger in expert hands, and is almost a certain cure.

"That physicians are not unwilling on occasion to try on their own persons methods of treatment which promise more than those heretofore known to medical science, seems indicated by the fact that of my 102 patients, no less than 14 were physicians, and 5 others were members of the immediate families of physicians. One physician and his wife were both operated on during the same afternoon."

While few seem to have shared Edebohls' convictions as to the curability of chronic nephritis by decapsulation, and while no other surgeon has reported such a notable number of similar cases, yet his work has stimulated the obviously rational procedure of relieving the intense congestion of acute infectious nephritis by dividing or removing the renal capsule. This is, after all, but an efficient and prompt method of accomplishing the relief sought through the time-honored methods of cupping, fomenting, and blistering the region of the kidneys.

Many reports of the success that follows early decapsulation in acute infectious nephritis are on record; a typical example is the following case reported by Harding.¹

¹ Journal American Medical Association, July 10, 1909.

A boy, aged twelve years, had an ordinary case of scarlet fever with only a moderately high temperature and well-defined rash; was out of bed on the tenth day, feeling well and showing no signs of any complications. Urinalysis, made on the fifteenth day, showed no trace of albumin or sugar; specific gravity of 1023. Twenty days after the onset of the fever the boy was taken with severe vomiting; twelve hours later he had a hard convulsion and passed a small amount of bloody urine heavily loaded with albumin. The boy was put in hot packs with hot linseed poultices over the kidneys, pilocarpin and digitalin given hypodermically. This treatment was followed four successive days with no apparent benefit. On the morning of the fifth day there was complete loss of vision and hearing, and a few hours later the patient lapsed into unconsciousness, with complete suppression of urine.

The next morning, under ether anesthesia, both kidneys were decapsulated at the same time. They were found to be as large as an adult's kidneys, very tense and congested. On removal of the capsule the blood fairly boiled from the kidney surface, showing the very high pressure it was under.

The first twenty-four hours after operation the apparently functionless kidneys secreted twenty-four ounces of urine. On the third day sight and hearing began to return, and at the end of the first week both were normal. The kidneys were also secreting the normal amount of urine. The boy left the hospital on the eighteenth day, able to walk, and feeling normal in every way.

Croom¹ advises decapsulation in *puerperal eclampsia*; he reports a personal case and collects twenty-six others from the literature, which indicate that this is a life-saving measure.

Runge² also indorses decapsulation in *puerperal eclampsia*, in cases where the coma or convulsions persist after delivery. He does not operate before the expulsion of the child, since spontaneous recovery often ensues thereafter. Eight of seventeen decapsulations personally observed, recovered.

Müller,³ in a case in which coma, convulsions, and anuria persisted after delivery, decapsulated both kidneys, though the patient was almost moribund. Rapid improvement began at once. He quotes twenty-three cases from the literature, which illustrate the value of this measure.

Alsberg⁴ secured prompt recovery after decapsulation in four cases of *puerperal eclampsia*, and remarks especially upon the prompt increase in the amount of the kidney secretion which follows the operation.

Trephin's⁵ patient developed acute unilateral nephritis with serious

¹ Lancet, March 27, 1909.

² Berliner klin. Woch., 1908, No. 46.

³ Journal American Medical Association, February 20, 1909.

⁴ Zentralblatt f. Gynäkologie, July 3, 1909.

⁵ Archiv f. Chirurgie, December, 1908.

hemorrhage during the course of an osteomyelitis; the swollen kidney could be distinctly palpated. The organ was exposed, found to be dark red and deeply congested; decapsulation was performed. The urine contained blood for two days longer, then it became clear. The patient recovered without further symptoms of kidney disturbance.

Kümmell¹ has performed decapsulation in thirty cases of anuria from acute and chronic nephritis, with ten recoveries and great improvement in fifteen of the others. He considers decapsulation an extremely valuable measure for the relief of prolonged chronic nephritis before anuria develops; also in acute infectious nephritis with anuria, following scarlet fever, puerperal or other sepsis. All of his cases which were decapsulated for the relief of anuria from acute infectious nephritis recovered the renal function. Catheterism of the ureters may accomplish the same result in anuria from either acute or chronic nephritis, apparently through the irritation of the ureter mucous membrane by the catheter. If the urinary flow does not begin promptly after the insertion of the catheter, he advises proceeding to operation.

Lipburger² decapsulated both kidneys in a case of chronic nephritis, with marked failure of vision from impairment of the retinae. The improvement was marked in the general condition and especially great in vision.

Urban³ relieved promptly and permanently by decapsulation recurrent attacks of intense pain in the right side of a young woman, which had persisted for five years. An exploratory laparotomy had been made for examination of the suspected gall-bladder, which was found to be normal. Later the appendix was removed, but the severe pains persisted. Finally, at a third operation the right kidney was exposed; though apparently normal, it was decapsulated. Since this operation the patient has been free from pain. The author calls this "neuralgia of the kidney," though ignorant of its cause.

Rovsing⁴ also indorses decapsulation for the relief of acute infectious nephritis, upon a personal experience with some twenty cases.

Anuria. Kümmell⁵ states that anuria is comparable in gravity with acute intestinal obstruction or strangulation; that although he has seen complete anuria from calculous obstruction persist for twenty and even thirty days without serious symptoms, and then be followed by spontaneous restoration of the renal secretion, yet such cases are rare exceptions.

Anuria usually results either from calculous obstruction of one or both ureters, or from nephritis. If the *x*-ray shows the cause of the trouble to be a stone small enough to pass through the ureter, attempts

¹ Berliner klinische Wochenschrift, April 19, 1909.

² Therapeutische Monatshefte, October, 1908.

³ Ibid.

⁴ Zeitschrift f. Urologie, August, 1909, Beiheft 1.

⁵ Berliner klinische Wochenschrift, April 19, 1909.

to provoke its expulsion through the use of the ureter catheter may be made. The injection of oil into the affected side, of water into the opposite renal pelvis, has in a few cases seemed to provoke sufficient peristalsis of the ureter to force the concretion into the bladder. Kümmell advises that the time spent in such endeavors be short; and that when they fail, as they usually do, the calculus should be at once removed. If the concretion has long existed, as indicated by its size and the patient's symptoms, the kidney should be incised; and this should be the rule when the patient is distinctly uremic. When both ureters are obstructed, his experience confirms the wisdom of operating first on the side last obstructed.

When the anuria is due to acute or chronic nephritis, decapsulation should follow failure of the usual medical means for relief.

Simultaneous Bilateral Nephrolithotomy, which was advocated by Watson two years ago, receives support from two cases reported by Cabot.¹ In the first case but one kidney was first operated on, though the lithiasis of the opposite kidney also had been detected by the *x*-ray. Eighteen days after this operation, severe pain in the right renal region occurred, and complete suppression of urine followed, no urine escaping from the opened kidney. The opposite kidney was promptly opened, after which both kidneys drained freely, and the patient recovered.

In the second case, the *x*-ray having shown calculi in both kidneys, both organs were opened at the same sitting; recovery promptly ensued. In this case it would have been impossible to decide in advance which was the better kidney.

Kidney Infarcts are discussed by Cobb,² on the basis of the experience in the Massachusetts General Hospital, where the first case was identified by A. T. Cabot in 1901. Cobb reports eight cases including several personally operated on. The colon bacillus was identified as the infecting agent in all, though the factor which usually precedes and predisposes to the localization of the organism in the kidney was not always apparent.

Hemorrhagic Pyelitis was observed in three cases operated on by Frisch;³ he found that the bleeding proceeded from the renal papillæ. He considers this an almost unknown lesion, from the clinical standpoint.

Kidney Tumors are discussed by Bloch⁴ in reporting 126 such cases operated on by Israel, all but two of them by nephrectomy. Twenty-eight died soon after operation, and three more from metastases while in the hospital. Of the 96 operative recoveries, 91 were traced; of these, 8 developed metastases within two and one half years; while 29 were known to be free from recurrence at the end of three years, and 19 at the end of five years.

¹ Boston Medical and Surgical Journal, February 18, 1909.

² Annals of Surgery, 1907, p. 680.

³ Zeitschrift f. Urologie, 1909, Heft 6.

⁴ Ibid., Band 6.

The author concludes that the removal of a kidney tumor offers a chance of permanent recovery better than that given by removal of a rectal or gastric cancer, and quite equal to the best results obtained by operation for carcinoma of the breast.

Lavage of the Renal Pelvis and Ureter for pus infections of the urinary duct is exhaustively reviewed by Garceau;¹ upon a careful review of the literature and considerable personal experience, he bases the following conclusions:

1. Renal lavage is but seldom required, and it should not be used indiscriminately. There must be careful deliberation before resorting to this method of treatment, and the patient should have been under observation a considerable length of time before the treatment is proposed.

2. Acute cases are not suitable for this method of treatment.

3. Thorough free drainage of the kidney through the ureter must be secured before permanent relief can be expected.

4. The most suitable cases are those of simple chronic suppurative pyelitis without obstruction, but these cases are very rare, and, unless the germ is a very virulent one, such patients usually get well in the course of time.

5. The method may be used in an endeavor to cure an inflammation, in a hydronephrotic sac as a preliminary to nephropexy, but the kidney should be supported meanwhile by an appropriate apparatus.

6. It will at times get rid of the infection in pyonephrosis, but this rarely occurs. It should never be permitted in severe pyonephrosis with general systemic infection.

7. A permanent catheter in the ureter is very dangerous, especially in the presence of acute infection with general symptoms.

8. The treatment does little or no good in a case of ureteritis with marked tissue changes in the ureter leading to sclerosis and thickening.

9. Renal lavage is seldom followed by any serious harmful sequelæ.

10. Enough cases have not yet been reported to give definite standing to the treatment.

11. Further trial is needed.

The fact seems to be that lavage of the renal pelvis for pus infections thereof is theoretically parallel with, but practically even less successful than, lavage of the bladder for pyogenic infections of this organ. After many years we have learned fairly well that a pus infection of the bladder requires the removal of the cause, that antecedent factor which has lowered the natural resistance of the vesical lining to pyogenic bacteria. In such cases we search for impediments to the exit of urine, for a calculus, tumor, etc., and we endeavor to remove these rather than at once resort to routine washing of the bladder, as was formerly the general custom.

¹ Journal American Medical Association, January 23, 1909.

The principle is equally applicable to pus infections of the upper urinary channel; routine lavage of the renal pelvis for pyelitis is as irrational and misleading as is routine lavage of the bladder for cystitis. When the cause of either is removed, lavage is unnecessary; until the cause of either is removed, lavage is useless. These remarks do not apply to gonococcus infection of the pelvis and ureter; here no antecedent lesion is necessary, and in this infection renal lavage is entirely rational and often successful.

The Corset for Movable Kidney and associated visceral ptoses is discussed and illustrated by Gallant.¹ He presents the observations of fifteen years upon 456 women. He quotes various surgeons as authority for the alleged failure of operative attempts to relieve these ptoses, and discusses in detail the factors entering into the problems presented for solution. Eight years ago he maintained that 90 to 95 per cent. could be cured symptomatically by wearing a corset

"If it is permissible to judge by subsequent experience and by the number of cases in which fixation has failed to fix or relieve the symptoms, my estimate at this time would be that not more than one per cent. require operation."

The distinguishing features of his plan in the treatment of visceral ptoses, involving one or several organs, are:

1. Gravity replacement in the semi-opisthotonos posture, massage, exercises, and rest cure.
2. Support of the replaced organs by a special made-to-order corset of fashionable design, "V'ed" in front, fastened by one lace inserted from the waist down, put on and laced while in the semi-opisthotonos posture, and worn at all times, except when lying down.

The absence of belts and buckles, flaps and straps, plates and trusses, air bags and kidney pads, and insecure elastic webbing, the fact that it is a real corset, which, though at first troublesome to adjust, improves her figure, affords just what she needs in the way of real comfort and support, on which her clothes hang gracefully.

The Phloridzin Test of kidney function is defended by Kapsammer,² who maintains that it is an improvement on the indigo-carmin test if the interval before the colored urine appears is also recorded. The determination of the interval that elapses between the injection of the test fluid and the response in the urine is the important feature of this test. Moreover it permits the distinction between injured kidneys still capable of normal functioning and those which do not functionate properly.

Bacteriuria is discussed by Geraghty,³ who also reports four cases personally observed. He formulates these conclusions:

¹ Journal American Medical Association, November 7, 1908.

² Wiener klinische Wochenschrift, October 1, 1908.

³ Bulletin Johns Hopkins Hospital, January, 1909.

1. Bacteriuria, when persistent, is always due to organisms of slight pathogenicity.

2. Bacteriuria due to the *Bacillus coli communis* produces an acid urine. When due to *Staphylococcus albus* it may be alkaline and give rise to a troublesome phosphaturia.

3. It is secondary to some focus in the urinary tract or neighboring organs.

4. It may persist indefinitely despite all treatment without producing any inflammatory reaction on the part of the vesical mucosa.

5. The results of vaccine therapy are entirely negative.

Calculi in Kidney and Ureter were discussed by the Southern Surgical and Gynecological Association.¹ Richardson emphasized the necessity for studying the clinical history of these patients, since in many the concretion had existed a long time before discovery. The indications for operation are hopeless impaction of a stone in the ureter, or the mere presence of a stone in the kidney. Since the great operative danger is hemorrhage in nephrotomy as well as nephrectomy, the anterolateral incision is best. Nephrectomy seems never justifiable for stone unless the destruction of the kidney demands it, especially because the remaining kidney is liable to contain the nuclei of stone.

Parham had been impressed with the absence of pain and other subjective symptoms in a patient from whom he removed a large renal calculus.

McGuire mentioned three cases in which blood and pus issued from the right ureter, and the symptoms accorded with those of ureter stone. The negative findings of the *x*-rays decided the diagnosis in favor of appendicitis, which operation proved to be correct, the appendix in each instance being found adherent to the ureter, causing a secondary ureteritis. The urine promptly cleared in each case soon after operation.

Bevan said that accurate kidney work requires team-work by four men—surgeon, *x*-ray expert, cystoscopist, and urinary analyst.

The best incision for removing calculi from the pelvic portion of the ureter is still under discussion. Gibson² describes an extraperitoneal incision which in two cases enabled him to lift the ureter up to the level of the skin and remove a calculus easily. It begins at the median line a finger's breadth above the symphysis, proceeds parallel to Poupart's ligament, and then vertically upward to or beyond the anterior superior spine. The upper flap is carried upward, the fibers of the oblique muscles separated, the transversalis fascia divided at the border of the rectus, which is retracted.

KIDNEY CONDITIONS SIMULATING RENAL CALCULI are illustrated in an article by Robinson.³ In the first case excruciating pain of ten days'

¹ Journal American Medical Association, January 9, 1909.

² Annals of Surgery, 1908, p. 445.

³ Journal American Medical Association, April 17, 1909.

duration in the region of the right kidney, which had required the administration of morphine and chloroform, was found to be associated with infected infarcts of the kidney, no other lesion being discovered in that or in the surrounding organs. The patient has remained well for a year. In other cases a pyonephrosis and a "fibrous calculus" were found to cause severe renal pain.

Extrarenal pathological conditions also may closely simulate renal calculi; prominent among these is *appendicitis*. Three instances of the symptomatic parallelism between these two conditions are related by McGuire.¹ The history and the pain were consistent with either appendicitis or calculus in the right ureter. The urine contained much blood and pus, the ureter catheter showing that these came from the right ureter; but the *x*-ray picture was negative in each instance. The incision for appendicitis showed an inflamed appendix adherent to the ureter. In each case the urine became clear within a week after the appendix was removed.

Schlagintweit² reports two cases of infection of the ureter from appendicitis; in one of these complete obstruction of the ureter and destruction of the kidney followed, necessitating nephrectomy.

Anomalies of the Ureter. Robinson³ discusses and illustrates anomalies, especially duplicity of the ureter. He states that personal observation showed partial or complete duplicity of the ureter in six of 100 cadavers examined; and that he has collected in ten years fifty specimens of complete unilateral duplicity of the ureter.

Bryan⁴ observed in a ten-year-old girl three ureters, two normal and the third leading from the left kidney into the vagina. There was severe pyelitis on the left side, from ascending infection. The left kidney was exposed and opened, and a catheter passed from its pelvis through the anomalous ureter into the vagina. The entire ureter was then removed. The pyelitis ceased and the child is well.

ATROPHY OF KIDNEY FOLLOWING FISTULA OF THE URETER has been observed by Asch⁵ in several instances; in one of these persistence of the fistula caused removal of the kidney, which was found completely atrophied. Asch infers that the apparent healing of a ureteral fistula, a common observation, may often be due to the cessation of function by the kidney; and that this possibility should be considered both as an argument for operative closure of the fistula and against nephrectomy or ureter implantation.

When for any reason surgical interference for the relief of ureteral fistula has been for a considerable time deferred, it is prudent to wait

¹ Journal American Medical Association, January 9, 1909.

² Zeitschrift f. Urologie, August, 1909, Beiheft 1.

³ American Journal Dermatology, August, 1909.

⁴ Transactions Tri-State Medical Association, 1908.

⁵ Berliner klinische Wochenschrift, October 5, 1908.

longer; for atrophy of the kidney may be already far advanced, and soon be complete, with spontaneous closure of the fistula. The sound kidney gradually acquires the ability to perform the work of both.

The Prostate and Bladder. Forty hypertrophied prostates removed by Israel were examined microscopically by Cohn.¹ In every case the new growth was found to start in the epithelium of the gland, constituting therefore a papillary adenoma. It would seem from this that prostatic hypertrophy is essentially an epithelial neoplasm, and not an inflammatory product.

The clinical results were six deaths, and two cases of incontinence in the thirty-four recoveries.

Freyer² presents the results of *supra-pubic prostatectomy* as performed by him on 600 patients between forty-eight and eighty-nine years of age, the average age being over sixty-eight years. The majority had been dependent upon the catheter for many years; many were in poor health and some almost moribund. Of the 600 patients, thirty-seven died within thirty-seven days after operation. If this entire mortality be charged to the operative interference, the death rate is 6.15 per cent. for the entire series, steadily decreasing from 10 per cent. in the first hundred to 4 per cent. in the last. In 108 cases vesical calculi were removed, together with the prostate.

The causes of death are enumerated, the list showing that not half of the thirty-seven deaths can be fairly ascribed to the operation; the actual operative mortality is therefore only 3 per cent. for the entire series.

The two patients first operated on by Freyer, eight years ago, are still living, aged seventy-five and seventy-nine years respectively. They had been entirely dependent upon the catheter prior to operation, but have had no occasion to use one since. They are entirely free from urinary symptoms and the sexual power was regained.

Continuous Irrigation is stated by Marion³ to eliminate the two dangers used as arguments against *suprapubic prostatectomy*, namely, sepsis and hemorrhage. He inserts into the suprapubic wound two tubes, a small one for the inflow, a wide one for the outflow; through these 20 to 40 quarts of cold boiled water are allowed to flow each day for three to ten days, after which daily irrigations are made through the urethra. Eighteen patients so treated have made excellent recoveries.

Compression of the ureter by the vas deferens is considered by Tandler and Zuckerkandl⁴ to be a cause of renal retention following prostatic hypertrophy. The raising of the trigonum and vesical base because of the prostatic enlargement causes the pressure of the ureter against the

¹ Deutsche medicinische Wochenschrift, April 1, 1909.

² Lancet, May 1, 1909.

³ Presse médicale, January 16, 1909.

⁴ Berliner klinische Wochenschrift, November 23, 1908.

vas where it is crossed by the latter. They regard renal retention as a more urgent cause for prostatectomy than vesical obstruction.

The prevention and treatment of the sequelæ of *perineal prostatectomy* were discussed before the American Surgical Association by Moore.¹ He estimates the mortality at 6 per cent., the failures at 17 per cent. Some of each are inevitable, but the present figures are too high. Injury to the rectum is the most frequent and serious; this is due to rough handling and dissection, and should be avoided. Strictures at the location of the prostatic urethra are common; they can be minimized by leaving the mucous membrane to cover the defect when healed. Incontinence of urine is not rare, and is hopeless. Moore follows the usual erroneous assumption that the compressor urethræ is the chief sphincter of the bladder.

In the discussion Bevan expressed a decided preference for the suprapubic operation. Richardson, Murphy, and others follow the usual plan of election, using the perineal approach when the prostate lies low in the perineum, the suprapubic in other cases.

Stillman stated that he follows the plan of MacEwen; when the urine can be made fairly free from infection, the latter uses the suprapubic incision; in other cases he makes the incision for lateral lithotomy on each side, and allows the urine to drain away for eight or ten days. By this time the wounds are granulating, the capsule of the prostate is retracted, and the cut surface of the gland protrudes into the incision; each lobe can now be shelled out with no bleeding and but slight danger of infection.

Another route for access to the prostate is described by Soubeyran,² and designated *ischiobulbar prostatectomy*. The incision extends from the symphysis pubis to the ischial tuberosity, parallel with the pubic ramus, and enables the operator to separate the ischiocavernosus and bulbo-cavernosus muscles, and to incise the two layers of the triangular ligament without hemorrhage. The prostate, lying immediately behind the deep layer of this ligament, is easily reached and enucleated. He has performed this operation with entire satisfaction on two patients.

Extravesical Suprapubic Prostatectomy was performed by Stockum. He made a median incision immediately above the symphysis, giving access to the prevesical space of Retzius; this was cleared of fat so as to expose the prostate. An incision into its capsule, to one side of the median line, enabled him to enucleate the gland, the urethra being identified by a sound resting therein. The healing was complete on the twelfth day.

Whatever of advantage may be offered by these newer methods of

¹ Annals of Surgery, July, 1909.

² Archives générales de Chirurgie, March, 1909.

³ Zentralblatt f. Chirurgie, January 2, 1909.

approaching the prostate seems to be more than offset by the restriction of the operative field.

The determination of the renal capacity as a preliminary to prostatectomy was the subject of a report to the German Urological Congress by Paschikis,¹ based upon observations in sixteen cases. The *functional capacity of the kidneys* was determined by chromatocystoscopy, whereby the cases in which the kidneys were damaged beyond repair, and prostatectomy unavailing, were identified. Four c.c. of a 4 per cent. suspension of indigo-carmin suspension in salt solution were injected into the gluteal muscle, and the interval before the blue color of the urine became apparent, the intensity of the color and the duration of its appearance were all noted. Cases that at first seemed hopeless were found by repetition of this test to present surprising improvement in the renal capacity under systematic catheterism and bladder drainage; four such cases were then submitted to prostatectomy, the result showing complete restitution of the kidney function. The author believes this method should be a means of improving the status of prostatectomy, reducing the mortality by excluding from operation the hopeless cases.

SYSTEMATIZED TECHNIQUE OF SUPRAPUBIC PROSTATECTOMY is the title of a very intelligent discussion by Kolischer² of the disadvantages and the adverse sequelæ of the transvesical operation, and suggestions for avoiding them. The article is illustrated with both pencil and pen from cases in the author's personal experience. He has abandoned suspension of the bladder and drainage of the prevesical space, and takes pains to cover the defect after the removal of the prostate by the mucous flaps that remain; he also gives specific directions for removing the various prostatic projections in the way best calculated to preserve their mucous coverings.

Perineal Drainage in Suprapubic Prostatectomy is secured by Ransohoff³ by means of a large trocar and cannula, which is "pushed through the most dependent part of the emptied prostatic pouch against a finger of the left hand placed a little over half an inch in front of the anus. By backward pressure the finger of the right hand protects the rectum. This is easily done without changing the position of the patient. The bulb is avoided and the membranous urethra undisturbed.

"The trocar being then withdrawn, the cannula projecting through the perineum, the largest self-retaining catheter or a drainage tube is pushed through the cannula from within. The cannula is then removed through the suprapubic opening."

The danger of injuring the ampulla of the rectum which attaches to this procedure, is avoided by opening the membranous urethra and prostatic pouch from the perineum; while the same drainage is secured.

¹ Wiener klinische Wochenschrift, March 27, 1909.

² Journal American Medical Association, April 10, 1909.

³ Ibid., September 12, 1909.

The Injection of Alien Blood into the prostate and vicinity for the treatment of prostatic hypertrophy has been reported by Jungling¹ in 21 cases treated by Bier. The attempt was inspired by Bier's experience with such injections as a means of inducing atrophy in malignant growths.

Jungling saw the best results in the treatment of acute retention; in these cases the effect of the injections seemed to be prompt and unmistakable, the urinary function being restored at once. In the cases of partial chronic retention the effects were less pronounced, though in the author's opinion the ability to urinate was distinctly improved.

This method can hardly be expected to arouse more than passing interest. Similar results were long ago reported from the injection of iodine and other substances into the prostate—often with the production of serious abscess formation.

THE INDUCTION OF PSYCHIC ABERRATIONS BY DISEASE OF THE PROSTATE is the subject of further comment by Percy,² based upon three cases related in his article. These were all elderly men of good intellectual and social grade, who manifested gross sexual perversions in connection with prostatic enlargement. Resection of the vasa deferentia in one case and removal of the prostate in another was followed by prompt and permanent disappearance of the mental aberrations.

Percy's deduction that a direct and peculiar relation exists between prostatic perversion and psychic aberration seems, however, scarcely justified. I have seen similar sexual aberrations with recovery in elderly men who had no apparent prostatic disease and certainly no treatment for such disorders.

The natural tendency of age toward a lower psychic plane is often shown in sexual aberrations, which are sometimes temporary, at other times permanent.

Lavastine³ cites the frequency of *neurasthenia* among the subjects of chronic prostatitis; he quotes Drobuy's report of neurasthenia in 162 out of 168 cases of *gonorrheal prostatitis*, while he found only 41 neurasthenics among 605 cases of chronic urethritis without involvement of the prostate. Moreover, nearly all the neurasthenic subjects of prostatitis recovered their nervous equilibrium when the prostatic disease was cured. He also quotes experiments indicating that prostatic substance introduced into the circulation raises blood pressure. Boehm's⁴ article follows similar lines.

Like most writers, these authors ignore the usual participation of the seminal vesicles in the chronic disorder; for most cases of so-called chronic prostatitis are in fact prostatovesiculitis; and inferences from

¹ Deutsche Zeitschrift f. Chirurgie, November, 1908.

² Illinois Medical Journal, November, 1908.

³ Revue de médecine, March, 1909.

⁴ Journal Missouri State Medical Association, March, 1909.

Drobuy's or similar observations apply with equal force to vesicles and prostate.

The fact seems to be that the mental depression and neurasthenia that frequently result from chronic prostatovesiculitis need not be ascribed to any hypothetical internal secretion or its absence, but can be explained on obvious grounds, especially toxemia.

PROSTATIC CALCULUS. A large prostatic calculus, weighing over 10 ounces and measuring four and three and one-half inches in its greatest dimensions, was removed by Ravasini,¹ whose article is illustrated with a skiagram of the concretion. Combined suprapubic incisions were required, the rectum sustaining considerable injury during the operation.

The description suggests the possibility that this, like that removed by Kapsammer, which was as large as a goose-egg, and several others, was formed in the utricle rather than the prostate, though this possibility is not mentioned by the author. The distinction is important from the surgical standpoint.

TUMORS OF THE BLADDER were discussed by Casper and Zuckerkandl² before the German Urological Congress in April, 1909. Casper stated that three-fourths of these tumors were found in men, usually over thirty years of age. Only papillomata are benign, and probably few of them fail to develop malignant features.

Radical extirpation is the only treatment to be recommended. The benign growths are best removed by intravesical operation, through the cystoscope. This method, as Nitze's experience demonstrated, gives a much smaller percentage of recurrence than the operations through a bladder incision.

Zuckerkandl stated that of fifty vesical papillomata removed by him, over half presented undoubted evidences of malignancy in structure.

He thinks that proper extirpation gives about 70 per cent. of permanent recovery. He insists that the entire thickness of the bladder wall must be removed—a resection of the bladder. All less radical measures give but little hope of permanent relief. When the growth involves a considerable portion of the vesical wall, the entire bladder should be removed.

Lichtenstern stated that 26 of 44 vesical papillomata removed by himself were cancerous. He thinks that practically all of them became malignant in time.

Verhoogen reported two extensive tumors of bladder and prostate which he had removed by the coccygeal method.

Strauss had observed sixty-six cases, of which thirty-seven were obviously malignant.

Brougersma reported 48 cases personally observed, of which 25 were

¹ *Folia Urologica*, January, 1909.

² *Zeitschrift f. Urologie*, 1909, Heft 6.

papillomata. Two of the latter he removed by intravesical operation; both recurred. He then removed them through a suprapubic incision, which operation also was followed by recurrence. Of 18 papillomata which he removed primarily by the transvesical route, 11 remained free from recurrence.

Zuckerkindl, Kapsammer, and others advised that the endovesical method be restricted to the removal of small and easily accessible papillomata.

It seems lamentably well established that vesical tumors, even the innocent-looking papillomata, are virtually all malignant, demonstrably or potentially, as Guyon long ago suspected; that any method of removal—for example, the intravesical snare—which prevents lodgement of cancer elements in a cut surface, gives less chance of recurrence; and then when the tumor is approached through an incision, as often happens, the cautery sling rather than the knife should remove the tumor, whenever practicable.

Cancer of the Bladder is discussed by Berg,¹ in an argument for partial rather than total cystectomy. The results already published show that the freedom from recurrence after partial cystectomy is as great as when the whole organ is removed, while the operative mortality is only half as great. Moreover the disposition of the ureters after total cystectomy is a serious problem, which does not appear when a part of the bladder is preserved. He thinks that the removal of a third of the bladder is always feasible.

CHYLURIA WITHOUT FILARIÆ has been reported by four observers during the past year; the discovery that the source of the chyle was a direct communication between chyle bearing vessels and the urinary tract is another tribute to the utility and popularity of the cystoscope. In Levy's² case chyle appeared in the urine only when the patient assumed the recumbent posture; it was therefore present during the urine of the night, but absent during the day. The cystoscope showed that the chyle came entirely from the right ureter, the left furnishing normal urine whatever the patient's posture might be. Moreover, in the horizontal posture the mixed chyle and urine from the right ureter was about three times as copious as the urine furnished by the left kidney, while when the chyle was absent—in the erect position of the patient—the two ureters furnished equal quantities of urine.

From these data it seemed evident that a fistulous communication existed between the chylous and the upper urinary passages of the right side. In this and in the following cases of chyluria no filariæ were detected in either blood or urine.

Salle³ reports a virtually duplicate case, except that the chyle issued from the left ureter.

¹ *Annals of Surgery*, September, 1908.

² *Deutsche medicinische Wochenschrift*, 1908, No. 38.

³ *Ibid.*, 1909, No. 4.

In Ludke's case both ureters furnished chyle-free urine, the fistula between chylous and urinary tract evidently entering the bladder, though this track was not discovered.

Pope² was fortunate enough to discover with the cystoscope the opening leading from the bladder to the space between bladder and rectum, through which he saw the chylous fluid enter the cavity of the bladder.

In none of the cases was there detected any antecedent lesion which might have produced such fistulous tracts; nor was there any apparent pathological result from the known escape of the chyle with the urine, nor from the possible escape of urine into the chyle vessels. None came to either the operating or to the autopsy table.

VESICO-INTESTINAL FISTULÆ are discussed by Parham and Hume.³ They have been able to collect reports of 385 cases, which present a varied and interesting series of lesions.

The solution of wax in benzine has been utilized by Pollak⁴ in removing a *wax taper from the bladder*. He injected 20 c.c. of benzine into the empty bladder, allowed it to remain for thirty minutes, and then rinsed it out with salt solution, repeating this procedure several times. The wax collected from the rising fluid weighed 3 grams. The wick, seven inches long, was spontaneously expelled on the following day.

Lohnstein and Hochenegg have removed tallow from the bladder in the same way. No irritation of the bladder from the benzine was observed in any of the cases.

RELIEF OF RETENTION OF URINE BY THE SUPRAPUBIC CATHETER is the subject of a paper by myself.⁵ Instead of repeated aspirations, or a cutting operation, I use the following method, illustrated upon the patient presented in the clinic.

"Seven days ago a man sought my aid for relief from the agonies of complete retention of urine that had existed thirty-six hours. The cause was a tight stricture of the bulbous urethra; and false passages already made defeated a patient effort to enter the bladder.

"Without anesthesia a trocar and cannula, No. 14 French scale, was passed into the bladder in the median line about an inch above the symphysis; the trocar being withdrawn, a soft catheter, No. 8 French, was passed through the cannula far enough to carry its end to the bottom of the bladder. The cannula was then withdrawn, leaving the catheter in its place. The catheter was attached to the skin by adhesive plaster; and after the urine had escaped the free end of the catheter was tied in a knot to prevent dribbling. The patient, who was allowed to be out of bed, was instructed to untie the knot every five to six hours, void urine

¹ Münchener medicinische Wochenschrift, 1908, No. 32.

² California State Journal of Medicine, August, 1909.

³ Annals of Surgery, July, 1909.

⁴ Wiener klinische Wochenschrift, July 9, 1908.

⁵ Medical Fortnightly, October 10, 1908.

through the catheter, and then retie the knot. Urotropin was given internally.

“For five days no attempt was made to pass the stricture, although during the last two of these days some urine trickled out of the meatus when the patient urinated through the catheter. During these five days the false passages in the urethra were healing, and the edema of the bladder-neck and prostate was subsiding. Two days ago a cautious attempt to pass a Banks’ bougie was successful, and the stricture was immediately dilated to 21 French. As the urethra was now open, the suprapubic catheter was withdrawn and its track left to heal spontaneously. The patient states that since the withdrawal of the catheter no urine has escaped through the puncture, which, as you see, is scabbed over and dry. It always heals when the obstructions in the natural channel are removed.

“Sometimes one fails to enter the bladder through the urethra after four or five days’ rest; in this case the suprapubic catheter may be left in position two or three days longer. Should the urethra still be found impassable (which in my experience has never happened), a cutting operation may then be considered, the patient being in far better condition to stand it because of the week’s rest of the bladder. Should still further delay be considered best, the catheter should be removed, cleansed of the adherent urinary salts, and reinserted; the track into the bladder will remain patulous for a short time.

“Should the obstruction be an enlarged prostate, and prostatectomy be considered unwise, the patient may wear the suprapubic catheter for an indefinite time, withdrawing it every day or two for cleansing. Patients easily learn to remove and reinsert the catheter through the fistula; one elderly patient of mine wore the catheter in this way for six years. Another, who had a cancer of the prostate that prevented urination, secured entire freedom from urinary troubles during the last nine months of his life through this device.”

Foreign Bodies in the Scrotum. Kretschmer¹ reports the removal of a small roll of gauze from the scrotum two and one-half years after an operation for inguinal hernia. The patient had been at work during this interval, and had noticed nothing wrong in the parts involved until two weeks before the gauze was discovered and removed; then some pain and a fluctuating swelling in the scrotum attracted his attention. A small discharging fistula was discovered, from which the end of the gauze protruded. The author refers to Neugebauer’s study of 236 cases in which foreign bodies were left in the abdominal cavity during laparotomy.

Hematogenous Orchitis and Epididymitis. Quénu² thinks that the frequent invasion of testicle, tonsil, and parotid in many septicemias is

¹ *Annals of Surgery*, June, 1909.

² *Presse médicale*, April 24, 1909.

not a mere embolic process, but is really due to a depurative function of these glands, similar to that exercised by kidneys and liver. He refers to the infection of the testicle common in many bacterial infections of the blood, and recalls Roger's finding of suppuration of the testicle in 48 out of 55 smallpox cadavers. He adds a case of testicular infection by the staphylococcus aureus, which seems to be unique. A previously healthy man exhibited evidences of severe general infection in connection with a carbuncle of the back. The staphylococcus was cultivated from the blood. During convalescence suppuration within the scrotal organs was detected; by puncture a liquid was secured from which the same organism was cultivated. As the patient had had no urethral infection, the source of the genital invasion seems to have been hematogenous.

The author does not mention the possibility of venous thrombosis, which is a frequent source of intrascrotal suppuration during blood infections.

THE OPERATIVE TREATMENT OF ACUTE GONORRHEAL EPIDIDYMITIS is discussed by Hagner,¹ with a report of twenty-one cases operated by incision of the epididymis and of the tunica vaginalis. He notes the immediate relief from pain, and the shortening of the time of convalescence. Pus was found in the epididymis in 17 of the 21 cases—in the tail twelve times, in both head and tail three times, in the head once, and in the tunica vaginalis once. Gonococci were demonstrated in this pus in 6 cases.

This operative interference, first practised and recommended in a paper read before the French Urological Society in 1903, by Escat,² ignores the obvious and important fact that since the gonococcus infection reaches the epididymis by way of the vesicle and vas, acute suppuration of the epididymis proves existing infection of the vesicle; obviously, then, the latter should be medicated by injections through the vas whenever the suppurating epididymis is incised. This procedure—which may be designated epididymovasostomy—I have practised with gratification to my patients as well as myself for over five years, having recommended it in 1905.³ While it is true, as Hagner notes, that "drainage of the vas may occur when the epididymis is punctured," yet again it may not; certain drainage and certain medication of vas and vesicle should be secured, by opening the vas and injecting the vesicle.

Epididymovasostomy, as advised by me, was indorsed at the recent meeting of the German Urological Association by Picker,⁴ who had successfully employed it in eleven cases, largely recurrent epididymitis.

¹ *Annals of Surgery*, December, 1908.

² *Annales des Maladies des Organes Génito-urinaires*, October, 1903.

³ *Journal American Medical Association*, April, 1905.

⁴ *Zeitschrift f. Urologie*, 1909, Heft 6.

The Cure of Masculine Sterility by Anastomosis between the Vas and the Head of the Epididymis, was discussed by Martin in a paper presented to the American Urological Association in June, 1909. Through the courtesy of the author, the following summary, based upon an experience with fifteen cases, is furnished.

1. The testicle departs from the type of duct glands in general from the fact that obliteration of its duct is followed neither by atrophy nor any appreciable change in its physiological function, since an incision into such a gland, the duct of which has been obliterated for many years, may show apparently normal and healthy spermatozoa.

2. Though the spermatozoa in their course through the epididymis may undergo changes sufficiently marked to be demonstrable microscopically, this period of their evolution does not seem to be essential to their vitality or their fertility, since taken direct from the afferent ducts they exhibit characteristic rapid and vigorous motion and if implanted upon the ovum impregnate it, as demonstrated by at least one case.

3. Epididymitis permanently obliterates the duct as the exception rather than the rule, nor is the likelihood of permanent obstruction gauged by the severity of clinical symptoms. Recurrent bilateral attacks, even though moderate in severity, seem more likely to produce a condition of azoöstermia than a single severe attack. Azoöstermia incident to gonorrhea or other affections may be due to obstruction in the epididymis, the vas, or the ejaculatory duct. The seat of obstruction is frequently in the ejaculatory ducts, is certainly at times in the vas, and, as shown by one case, may be multiple here.

4. An anastomosis between the vas and the epididymis or testicle can be successful only when there is no occlusion between the seat of anastomosis and the urethra. The presence or absence of obstruction in this portion of the canal can be readily determined by exposing the vas under local anesthesia and injecting a pigment, such as indulin, or carmine. This operation can be done quickly, and, if the proper jock strap be applied, implies no interference with the ordinary routine of life. This test should be made before attempting an anastomosis operation.

5. In my own work the anastomosis operation has been followed by a reappearance of healthy spermatozoa in six cases and three previously sterile marriages have been rendered fertile. The spermatozoa may not appear in the emission for weeks or months after the operation.

6. In the majority of cases presenting themselves because of azoöstermia the obstruction was not in the epididymis.

Its presence elsewhere is suggested by the absence of a previous history of epididymitis. Congenital absence of the vas in two cases sufficiently accounted for it. In one case there was a probable functional deficiency upon the part of the testicle itself.

7. The operation of anastomosis can be performed under local anes-

thetia, but not always satisfactorily to the patient. It is usually bloodless and detains the patient only long enough for its performance and recovery from general anesthesia when this is given. It leaves no appreciable scar, and, if the veins are carefully handled, is followed at most by a slight local soreness and trifling swelling.

Pus Tubes in the Male and Their Surgical Treatment was the subject of my address as President of the American Urological Association.

The pus infections of the urinary duct have been for centuries the object of clinical study and surgical exploration; those of the less conspicuous seminal duct remained virtually unexplored until the twentieth century. Pus tubes in the male are today as generally unrecognized and surgically ignored as were the pus tubes of the female thirty years ago. Even the accessible epididymis has constantly harbored gonorrheal pus until recently undetected and undisturbed by surgery.

A most important feature of the seminal duct, from the clinical standpoint, is its lack of distensibility; the seminal vesicle is inclosed in an unyielding fascial envelope, the vas deferens has a very thick wall of circular muscular fibers. When, therefore, the minute natural outlet, the ejaculatory duct, is occluded by inflammatory swelling or otherwise (and this often happens) the vesicle cannot expand indefinitely, as does the urinary bladder. When the accumulating pus or secretion exceeds the limited capacity of the vesicle, it is forced through the only other outlet, the vas deferens. Since the vas is highly muscular, the epididymis less so, the tail of the epididymis is the catch-basin for pus from the vesicle—not merely in gonorrhea, but in other urethral infections also.

An opening into the vas—vasostomy—affords not merely the means of injecting solutions into the vesicle, but also an exit for pus from the entire seminal duct, vesicle and epididymis included.

Vesicle and ampulla are closely bound to the base of the bladder; hence infection and distention of the vesicles induces contractions not merely of these, but of the bladder also. This straining to urinate every few minutes is often observed when a gonorrhea extends to the vesicles; with a discharge of pus from the vesicle (often mistaken for “prostatic abscess”) the bladder irritation ceases. Nor is this symptom-complex limited to gonorrheal infections; it is common in other pus infections which occlude the ejaculatory duct and thus distend the vesicle. For example, a man, aged sixty-eight years, referred for prostatectomy, was found to have merely a pus infection of the left vesicle and epididymis. The vas was opened, a little pus escaped; the interval between urinations, previously less than an hour, at once lengthened to four hours.

The close relation between ureter and bladder, on the one hand, and vesicle and vas, on the other, in the rectovesical space—which I have called the broad ligament of the male—leads to various urinary lesions caused by infections of the seminal duct. Thus, Morgan¹ described in

¹ *Annals of Surgery*, 1902, p. 528.

detail the occlusion of the ureter by adhesions to the infected seminal vesicle, the discovery and relief of which required several operations. A similar condition was reported by Young a year later.

Some of the symptoms known to be caused by pus infections of the seminal duct are these:

Urinary. Frequent and painful urination, retention, pyuria, "chronic cystitis."

Genital. Frequent involuntary emissions (even in married men), priapism, pyospermia, hematospermia; the chronic infections may result in fibrous thickening of vesicle, vas, and epididymis with hydrocele, impotence, sterility.

Chronic prostatitis, so-called, notoriously refractory to standard treatment, is usually prostatovesiculitis, which needs treatment directed to the vesicles as well as to the prostate. Imperfect erection and premature ejaculation are common results of prostatovesiculitis, requiring local treatment rather than strychnine and phosphorus.

Rectal. Pain, tenesmus, causing patients to consult rectal specialists.

Abdominal. Pain from pus tubes caused erroneous diagnosis of appendicitis in two instances, with futile operation in one, by a competent surgeon; mistaken diagnoses of ureteral calculus and renal colic have also been made.

Constitutional. The "neurasthenia" caused by prostatovesiculitis, commonly referred to nerve influence, may be rather a toxemia from the local infection; for it has been relieved through drainage of the vesicle (Fuller), and vasostomy. Analogy is found in the benefit that often follows drainage of the gall-bladder.

The *treatment* of pus infections of the seminal duct consists—like the treatment of other closed suppurating cavities—in two measures: relief of tension through evacuation of the pus, and medication of the mucous membranes. Both of these are accomplished simply and thoroughly by *vasostomy*—incision of the vas deferens in the scrotum, and irrigation of vas and vesicle through the vas.

I have reviewed briefly the various surgical measures previously used in the treatment of parts of the suppurating seminal duct:

The Vesicle. Incision of the suppurating vesicle from the perineum was made by Lloyd (1889); Dittel, the father of perineal prostatectomy used this incision to expose and incise the vesicle (1894). This operation has been improved and extensively used by Fuller (in over 100 cases). It is bloody, imperils the integrity of the rectum, but seems devoid of mortality.

The distended vesicle can be safely and easily opened from the rectum, the approach preferred by most surgeons. Bleeding can be minimized by incising with the cautery. If the outlines of the vesicle be obscure, it can be distended by infection through a vasostomy. Klotz, in 1895, introduced the nozzle of a special syringe through the endoscope into the urethral end of the ejaculatory duct and injected liquid into the vesicle.

The patient promptly developed epididymitis, presumably from forcing the vesicular contents through the vas. This ingenious procedure is for several reasons lacking in clinical value.

The Epididymis. Early in the last century the infected epididymis was punctured by Vidal and others, not for the evacuation of pus, but for the relief of tension. Incision of the non-fluctuating epididymis and tunica vaginalis for the evacuation of pus was introduced independently by Escat (1903) and Belfield (1905), the latter using the incision to inject vas and vesicle at the same time. The epididymis incision has been practised by Bazet also, and has been advocated by Hagner in acute gonorrheal epididymitis; it is equally necessary in non-gonorrheal, tender indurations of the epididymis, some of which contain pus.

Since non-tuberculous infections reach the epididymis by way of the vesicle and vas, acute suppuration of the epididymis proves existing infection of the vesicle; obviously, then, the latter should be medicated by injections through the vas whenever the suppurating epididymis is incised.

The advantages of this procedure over medical treatment are: (1) Shortening the time of pain, fever, swelling and confinement; the patient is ready to resume his ordinary avocation in three to five days; (2) avoidance of the usual chronic, tender induration in the tail of the epididymis, which sometimes contains pus and gives rise to recurrent epididymitis. Whether the chance of permanent occlusion of the epidymal canal is increased or diminished by the incision, remains for larger experience to determine.

VALUE OF VASOSTOMY. By this trivial operation the entire seminal duct is relieved of abnormal tension, vas and vesicle are drained and medicated, the epididymis is protected from infection or, if already infected, from pressure infection; it has sometimes seemed that the pus drained from the epididymis also. Medication of the vesicle is effective, because the injected solution remains in its cavity for hours or days.

I have opened the vas 149 times in 107 patients. The results have not been uniformly brilliant; in this tentative work diagnoses have doubtless often been faulty; yet many cases refractory to standard treatment have been promptly cured, such as frequent urination, "chronic cystitis," gleet, admixture of blood with semen, recurrent epididymitis. The following are specimen cases: (1) Man, aged forty-one years, recurrent vesiculitis and epididymitis of left side, repeatedly causing fever, frequent urination, pain along seminal duct, confinement to bed. Vasostomy and repeated irrigation of vesicle with protargol solution was made. No return of symptoms during two years. (2) Man, aged fifty-eight years, frequent urination, oozing of blood-stained mucus from meatus, bloody emissions; duration several months. Right vesiculitis; vasostomy and irrigation, with prompt cessation of symptoms.

This method of treatment has been practised and found valuable by various urologists at home and abroad.

THERAPEUTIC REFERENDUM.

By H. R. M. LANDIS, M.D.

Adrenalin. In previous numbers of PROGRESSIVE MEDICINE attention has been called to the experimental arteriosclerosis produced in rabbits as a result of injecting adrenalin solutions. Some doubt was thrown on the validity of these experiments by the observations of Miles and Johnstone.¹ These investigators suggested that the vascular lesions, believed by many observers to result from the injection of adrenalin, were in reality of spontaneous origin. They based their opinion on the results obtained from examining a large number of normal rabbits in which lesions similar to those produced by adrenalin occurred with equal or greater frequency. In further support of their claim they asserted that those who had worked with adrenalin had been careless about their controls.

Pearce,² who was one of the earlier investigators of lesions of the vascular system occurring in the rabbit after intravenous injections of adrenalin, has made a study of normal rabbits similar to that of Miles and Johnstone. He examined 62 animals; except for six pairs, these animals all came from the same locality. Of these 62 animals, 51 were presumably normal, as they had not been used previously for experiment of any kind. They had also been purchased but a short time and had a very short laboratory life. Vascular lesions were found in but 3 (6 per cent.). The lesion in these animals consisted of a few minute patches at the beginning of the aorta. Of the remaining 11 animals, 1 suffered from an abscess of the hip; 3 had received repeated injections of dog serum; 1, nephrotoxic serum; 1, human blood; 1, typhoid bacillus; and 3, chrome salts. These animals had been confined in the laboratory for several weeks or months. Vascular lesions were noted in 4 (36 per cent.). Those showing the vascular changes had received respectively injections of typhoid bacillus, dog serum, nephrotoxic serum and human blood. In 2 the lesions were diffuse, involving irregularly the entire aorta and comparable to those produced by adrenalin. In the other 2 a few small areas were present at the beginning of the aorta only.

Pearce's control study shows that spontaneous lesions were found in 3 of 51 presumably normal rabbits (6 per cent.), or including the

¹ Journal of the American Medical Association, October 5, 1907; PROGRESSIVE MEDICINE, December, 1907.

² Ibid., September 26, 1908.

11 experimental animals, 7 of 62 (11 per cent.). This last estimate he does not consider fair, however, as the possible influence of typhoid toxin and alien sera cannot be entirely set aside in view of our knowledge of the very general degenerative changes which these substances cause. In this connection he mentions an observation of Israel's. This observer has described and pictured a very diffuse lesion of the aorta in a rabbit receiving injections of alcohol directly into the kidney. Pearce states that the illustration plainly pictures a lesion of the aorta not to be distinguished from that caused by adrenalin.

From this study Pearce concludes that while spontaneous arterial degeneration may occur in the rabbit, it is not as constant a condition in all localities as the investigations of Miles and Johnstone indicate. Moreover, the figures here presented offer a satisfactory control of his earlier report on the general subject of experimental arteriosclerosis due to adrenalin, and the later report in which he concludes that single doses of adrenalin may cause arterial lesions, a conclusion which might appear doubtful if viewed only in the light of the experiments of Miles and Johnstone.

Pearce states that the occurrence of spontaneous lesions in the rabbit does not diminish the importance of the lesions due to adrenalin, but, on the contrary, increases their importance, as an example of a lesion occasionally occurring naturally, but which may be readily produced experimentally.

Crile,¹ who has done so much to popularize the use of adrenalin in the treatment of *shock*, points out that while the introduction of adrenalin into the venous circulation is easy and practical, it has the following disadvantage: The adrenalin first comes in contact with the vessels having the least power of influencing the blood pressure, and before a material rise can be expected by its action upon the arteries it is necessary that the solution should pass through the right heart, the lungs, and then back to the left heart on its way to the aorta, and finally the coronary arteries. Crile has also shown that the venous method of injecting the adrenalin solution too often caused an accumulation of the solution and blood in the dilated paralyzed chambers of the heart, and thus defeated resuscitation.

In cases of urgent necessity he advocates injecting the adrenalin solution directly into the arterial system. He gives both experimental and clinical data illustrating the value of this method.

Kothe² is so impressed with the value of adrenalin in shock that he advises that it be in readiness whenever patients are rendered insensible.

The introduction of adrenalin in solution into the venous system must be slow and continued, as the effect of the drug is transitory, and to be of

¹ American Journal of the Medical Sciences, April, 1909.

² Therapie der Gegenwart, February, 1909.

value must be sustained. Recent experiments by Mummery and Symes¹ also confirm the view now generally accepted, namely, that adrenalin to be effective in shock must be given intravenously (or by way of the arterial system as suggested by Crile), since when given by mouth or subcutaneously it is either decomposed or acts so slowly as to be of no value.

I have mentioned the use of adrenalin in the treatment of *asthma* in previous numbers of PROGRESSIVE MEDICINE. Von Jagie² states that he has found it of value in cases of genuine bronchial asthma, especially in young persons in whom there are no complications, such as emphysema or diseases of the heart and bloodvessels. He did not note any untoward effects, even after long-continued use of the drug.

He administered the adrenalin subcutaneously in doses of 0.5 c.c. (7½ minims) of a 1 per cent. adrenalin chloride solution. The attack was alleviated in about two minutes. In severe cases he gave as much as 1 c.c. (15 minims).

Roehmer³ reports good results in the treatment of *tabetic crises* from the administration of adrenalin. He has treated 3 cases of gastric crisis, one of rectal crisis, and one of laryngeal crisis.

In the gastric cases he administered, by mouth, four to six drops of a 1 per cent. solution of adrenalin in 20 c.c. of water. In the rectal case, after a previous irrigation of the rectum, he injected from three to five drops of adrenalin solution in 20 to 40 c.c. of water. These doses were given three times a day. The effect of the drug was noticed in from fifteen to thirty minutes and continued for several hours. The result in the laryngeal case was not favorable.

Bossi⁴ has obtained beneficial results from the use of adrenalin in the treatment of *osteomalacia* and *rickets*. For the former condition he gives two injections a day of 0.5 c.c. (7½ minims) of a 1 per cent. solution of adrenalin chloride. After some days there are symptoms of intolerance. The drug is stopped for four or five days and then resumed with the same doses.

As a result of his experience he believes that: (1) Insufficiency in the function of the suprarenal glands must be the cause, or a factor in the causation, of osteomalacia; (2) the suprarenal glands exercise an important influence upon the ossification of the skeleton—a fact previously unknown, but which he considers he has proved by radiographs on human patients and on sheep. He was also able to produce an experimental osteoporosis in sheep from which he had removed one suprarenal gland.

He points out the value of this observation in the treatment of *rickets*

¹ British Medical Journal, September 19, 1909.

² Berliner klin. Wochenschrift, 1909, No. 13

³ Semaine Médicale, 1909, No. 2.

⁴ British Medical Journal, September 19, 1909.

in children, as one will be able to accelerate the ossification of the skeleton in rickety subjects by the administration of adrenalin.

Lowery¹ states that he has obtained good results in the treatment of *neuralgias* by the use of *adrenalin ointment*.

Antidiphtheritic Serum. The early administration of antitoxin in sufficiently large doses is now acknowledged, beyond any doubt, to be the only treatment of diphtheria worthy of consideration. Failure in the majority of cases is due to withholding the antitoxin too long. This in most instances is the result of a faulty diagnosis, but it must be admitted that there is a small percentage of cases in which the infection is fulminating and in which even antitoxin is unavailing. Szontagh² is of the opinion that these fulminating cases are the result of a mixed infection.

Mackay and O'Brien³ report on 404 bacteriologically proved cases of diphtheria. Provided no complications are present they believe that the best control for the administration of the antitoxin, in faucial cases, is the patient's temperature. They advocate a large initial dose, to be repeated, if necessary, at intervals of eight to twelve hours, until there is a fall in the temperature to the normal. Practically none of their cases, except a few in which complications existed, showed a temperature range above the normal after the second day.

In the management of laryngeal cases they favor intubation as a routine hospital operation, after first trying an initial dose of 20,000 units of antitoxin, accompanied by external applications to the throat. If this fails, they intubate and administer more antitoxin. As a last resort tracheotomy is performed and more antitoxin is given, the child receiving in all 40,000 to 50,000 units.

Porter⁴ calls especial attention to the treatment of heart failure accompanying diphtheria. The essentials of treatment for the heart conditions accompanying diphtheria are: (1) Prompt and sufficient dosage of antitoxin. (2) Rest in bed not less than three weeks. (3) Attention to the condition of the abdominal viscera. (4) A nutritious, easily digestible diet. (5) Certain drugs, each according to the conditions. For a slow heart, atropine. For a racing heart, camphor and ice to the precordium; for vascular failure, ergot. (6) If the heart failure is incidental to an overwhelming toxemia with lethargy, hypodermoclysis.

Finally, the factors determining the number of units of antitoxin to be given are:

1. The intensity of the toxemia.
2. The extent of the involvement.
3. The time elapsed since the first manifestation of the disease.
4. Whether or not there is stenosis of the air passages.

¹ Alabama Medical Journal, December, 1908.

² Jahrbuch f. Kinderheilkunde, September 2, 1908.

³ Intercolonial Medical Journal of Australasia, February 20, 1909.

⁴ Archives of Pediatrics, August, 1909.

Ker¹ also emphasizes the importance of watching the heart from the very onset of an attack of diphtheria. From the very beginning Ker keeps his patients in the recumbent position; sitting up should not be allowed on any pretext whatever. He allows his patients one soft pillow, so that the head is scarcely raised. Two weeks later a second pillow is added, unless the pulse is poor, when it is desirable to wait longer.

Mild cases may be gradually propped up in bed from the middle of the third week and allowed to get up for an hour or two early in the fourth. If, however, the attack has been at all severe, it is safer to keep the patient in bed for at least four weeks. By this time, provided the pulse is satisfactory and there is no paralysis, most patients may arise with safety. Adults should not resume work or children return to school for some weeks longer.

Last year² the experimental work of Rosenau and Anderson on diphtheritic paralysis was reviewed. So far as guinea-pigs are concerned, antitoxin did not exert any favorable effect. They ventured the opinion, however, that as the poison is elaborated more slowly in man, antitoxin might be given, even after the paralysis has become established, with benefit. This seemed to be borne out clinically by a case reported by Middleton.³ Schneider and Vandeuvre⁴ report an additional case. A young adult who had recovered from an attack of diphtheria of moderate severity, under injections of antitoxin, remained well for five weeks, when he was suddenly attacked with paralysis. The paralysis involved all of the muscles of voluntary motion except those of respiration. Atrophy of the muscles became marked, the heart was irregular, and he was somnolent. Under injections of antitoxin he entirely recovered.

Ransom⁵ reports an instance of supposed prophylactic effect of antitoxin on a child *in utero*. Two children in a family were ill with diphtheria, and in addition, the mother, who expected to give birth to a child in a few days. The mother received 4000 units of antitoxin, and twelve hours later received 3000 more. Ten hours after the second injection the woman was delivered. Membrane was present in her throat for three days after the birth of the child. The child did not develop the disease.

Inasmuch as very young infants do not seem to be susceptible to diphtheria, the protection claimed in this case may be considered doubtful.

McClintock and King,⁶ who have previously written on the oral administration of antitoxins, have contributed another paper on the subject. Their method is as follows: When possible no food should be taken for at least four hours prior to administering the serum; one hour before giving the serum a glass of 1 per cent. sodium bicarbonate solution is

¹ Practitioner, January, 1909.

² PROGRESSIVE MEDICINE, December, 1908, p. 255

³ Ibid

⁴ Progrès Médical, August 29, 1908.

⁵ Journal of the American Medical Association, February 13, 1909.

⁶ Journal of Infectious Diseases, February, 1909.

taken. To the antitoxin is added one minim of fluid extract of opium, and from four to ten minims of a saturated solution of salol in chloroform.

For prophylactic purposes they believe the oral method is the best, but for curative measures the hypodermic method should not be replaced.

In nineteen children and hundreds of animals treated in this way there was no evidence of "serum disease."

ANAPHYLAXIS. Last year¹ I reviewed in full the phenomenon known as anaphylaxis, protein hypersusceptibility, or supersensitiveness. Rosenau and Anderson² have published another extensive review of the subject. Much of the data were included in the paper quoted last year, but in addition they have published the results of further studies.

It will be recalled that Besredka claimed that the phenomena of anaphylaxis could be prevented in guinea-pigs by ether narcosis. In order to determine whether there would be any practical benefit, in the prevention of anaphylaxis, in the administration of various hypnotics Rosenau and Anderson³ experimented with urethane, paraldehyde, chloral hydrate, and magnesium sulphate. As a result of these experiments it was shown that none of these substances had any influence in preventing a fatal outcome. Rosenau and Anderson believe that it is possible that the symptoms of puerperal eclampsia and the toxemias of pregnancy may be explained by anaphylaxis, and "that the blood or protein substance in solution from the fetus or the placenta may first sensitize the mother. A subsequent introduction into the system of the mother of a similar substance may explain the convulsions and the symptoms which occur in a certain class of the toxemias of pregnancy."

It is now the belief of those who have worked on the toxemias of pregnancy that the fetus plays no part in the phenomena. This Rosenau and Anderson found experimentally to be true. Female guinea-pigs, both pregnant and not pregnant, were injected with fetal blood, and after an appropriate interval were given a second infection of the same material. All these experiments resulted negatively.

They then made a series of experiments on female guinea-pigs with guinea-pig placental extracts. From these experiments it was evident that the mother guinea-pig may be sensitized with the autolytic products of her own placenta. They believe that these experiments suggest that there may be a certain relation between some cases of puerperal eclampsia and the phenomena in the guinea-pig which they studied.

Long before the phenomena of anaphylaxis were described tuberculin reactions were known. The tuberculin reaction is simply an instance of anaphylaxis due to the fact that the individual has already been sensitized by a tuberculous infection. This explains why a normal individual free from a tuberculous focus will not react to tuberculin while a tuber-

¹ PROGRESSIVE MEDICINE, December, 1908, p. 256.

² Archives of Internal Medicine, June, 1909.

³ Journal Medical Research, July 18, 1909.

culous individual promptly reacts, except in the later stages of the disease. The reason advanced cases of tuberculosis fail to react is because the hypersusceptibility has been developed and finally exhausted.

The necessity of first having a focus of infection before a tuberculin reaction can be obtained is pointed out by Baldwin.¹ The only exception to this, aside from the advanced cases, is the continued presence of tubercle bacilli without tubercles, such as occasionally occurs in children.

According to Rosenau and Anderson,² the practical lesson to be learned from this is: "When tuberculin is used in large or too oft-repeated doses there is a tendency to break down or to exhaust the useful and beneficial hypersusceptible state of the tissues. In accordance with this line of reasoning, therefore, tuberculin would be of benefit in tuberculosis only when used in such a way as to develop and not diminish the power of anaphylaxis of the tissues." In other words, to avoid the possibility of overstimulation and exhaustion of the tissues, such as occurs from auto-inoculation in the advanced cases.

Additional papers relating to experimental studies on anaphylaxis have been published by Wells³ and Gay, Southard and Fitzgerald.⁴

A very interesting and practical study of localized anaphylactic intoxication in children following the repeated injections of antitoxin has been published by Lucas and Gay.⁵ They point out that some years ago Arthus described the occurrence of local aseptic necroses in rabbits which had been given several subcutaneous injections of horse serum at week intervals. The animals showed no reaction at the point of inoculation after the first three injections of 5 c.c. of serum. The fourth injection, however, gave a white infiltrated area, the fifth a still further marked induration, which took five or six days to resorb, and the sixth injection gave rise to actual necrosis.

The point of these successive inoculations need not be the same. This local reaction is more constant than the systemic.

Lucas and Gay have noted this local reaction in children that have received two or more doses of antitoxin at frequent intervals. The frequency of the occurrence of their local reaction varies directly with the number of injections.

An analysis of 1000 consecutive cases gave the following results: Following a primary injection (1500 units) only 3 (0.03 per cent.) gave any immediate reaction. The reactions in these 3 cases were general but very slight and confined principally to slight rises in temperature. They may scarcely be regarded as instances of the same reaction that occurs on reinjection. In this connection I may add an observation made

¹ Yale Medical Journal, February, 1909.

² Loc. cit.

³ Journal of Infectious Diseases, October, 1908.

⁴ Journal Medical Research, July, 1909.

⁵ Ibid., April, 1909.

by Hamill.¹ He found that the children in an orphan asylum with which he was connected quite frequently had a sharp rise in temperature following prophylactic injections of antitoxin. The temperature which was previously normal would in a day or so subside after this elevation. This was the only untoward effect noted in these cases.

Following a second injection in 281 of Lucas and Gay's patients, 23 reacted (8.2 per cent.). Of these 23 cases, 10 gave only generalized symptoms; 9, both generalized and local; and 4, local symptoms alone.

Of 103 injected a third time, 15 reacted (14.5 per cent.). Of these 15 cases, 2 showed only generalized symptoms; 9, both generalized and local; and 4, local symptoms alone.

Of 36 receiving four injections, 13 reacted (27.75 per cent.). Of these 13, 2 showed generalized symptoms alone; 6, both general and local; and 5, localized only.

Following a fifth injection 12 (42.9 per cent.) of 25 cases reacted. Of these 12, only 1 had generalized symptoms; 5, both general and local symptoms; and 6 had local symptoms alone.

A sixth injection was given in 15 cases, of which number 11 (74 per cent.) reacted. Of these, only 1 showed pure generalized symptoms; 4, both general and local; and 6, purely local.

The percentage of cases reacting after the successive injections shows very clearly that the tendency to react is in direct proportion to the number of injections given.

While the minor manifestations of protein hypersusceptibility are not serious, the major effects, it will be recalled, are attended with alarming symptoms of collapse and occasionally by death. It is of the utmost importance to keep in mind that the majority of the fatal cases have occurred in individuals who suffered from distinct attacks of *asthma* or who were subject to slight asthmatic attacks when exposed to the odors emanating from horses. In some instances the antitoxin was administered for prophylactic purposes following exposure to diphtheria; in others the antitoxin was administered with the idea that it would exert a beneficial action on the asthma. The administration of antitoxin for the purpose of curing asthma is unwarranted, and cannot be too strongly condemned.

Gillette,² who was the first to report a death following the use of antitoxin in asthma, has recently published an article in which he has been able to collect from the literature and personal communications 28 cases in which either collapse or death followed the administration of antitoxin. The following table is taken from his article:

¹ Personal communication.

² Therapeutic Gazette, March, 1909.

	Age.	No. of dose.	Units.	Result.	Remarks.
1	52	First	2000	Died	Previous history of asthma for forty-two years.
2	31	First	3000	Collapse	Previous history of asthma; no asthma since collapse.
3	6	First	2000	Collapse	Previous history of cardiac dyspnea.
4	4	First	2000	Died	Previous history of bronchial asthma.
5	34	First	1000	Died	Had asthma when about a horse.
6	54	Second	6000	Collapse	History of asthma; asthma continued after collapse.
7	10	First	4000	Died	No history of any form of dyspnea.
8	13 mos.	First	600	Died	No history of any form of dyspnea.
9	6	First	600	Collapse	No history of any form of dyspnea.
10	Adult	First	2000	Collapse	Had asthma, which was not cured by collapse.
11	Adult	One dose 10 years previous	1000	Collapse	Previous history of sneezing and irritation of eyes when about a horse.
12	25	First	2000	Died	No history of respiratory distress.
13	Adult	Seventh	10 c.c. anti-streptococcic serum	Collapse	Had hay-fever history.
14	Adult	Tenth	10 c.c. anti-streptococcic serum	Collapse	No history of dyspnea.
15	Adult	First	2000	Died	Previous history of asthma.
16	Adult	First	2000	Died	Previous history of asthma.
17	13	First	3000	Died	History of chronic bronchitis.
18	5	First	500	Died	No history of dyspnea.
19	29	First	800	Died	History of convulsions; family neurotic.
20	Child	First	1000	Collapse	Previous history of asthma.
21	Child	First	1000	Collapse	Previous history of asthma.
22	33	First	2000	Died	History of asthma for years.
23	40	First	3000	Collapse	History of asthma for years.
24	30	First	2000	Died	History of asthma for years.
25	18	First	1000	Collapse	History of asthma for years.
26	Child	First	500	....	History of asthma for years.
27	Child	First	Not known	Died	History of thymic asthma.
28	18	First	1000	Died	History of asthma for years.

This table does not include 7 cases reported by me¹ in which alarming symptoms of collapse followed the use of Maragliano's antituberculous serum.

Of the 28 cases reported by Gillette, anti-diphtheritic serum was employed in 25, antistreptococcic serum in 2, and in 1 the serum used was not stated. Death occurred in 15 cases and collapse in 12; in 1 the result is not stated. It is significant that 21 of these cases were subject to respiratory troubles, the majority of them being asthmatics. As I stated last year, antitoxic sera should be given only with a very definite object and their empirical use in various chronic diseases avoided.

I was much interested in the following case reported by Bacon and Williams:² A man, aged twenty-eight years, suffering from diphtheria,

¹ PROGRESSIVE MEDICINE, December, 1908.

² Journal of the American Medical Association, April 10, 1909.

was given 2000 units of antitoxin. In about ten minutes he became restless, the face cyanotic, and the respirations difficult. The respiratory distress gradually became more marked, the nostrils dilated, and the expression agonized; the body was limp and covered with cold sweat. The attack lasted about twenty minutes, the dyspnea gradually diminishing. This was followed by an urticarial rash lasting for four hours. Morphine, $\frac{1}{4}$ grain, and atropine, $\frac{1}{150}$ grain were administered.

Dry antitoxin was then used in the nostrils, and after a few doses a slight attack of dyspnea occurred. Shortly after the first untoward effects *calcium lactate* in 5-grain doses was given every two hours.

The next day, as the membrane was increasing and the patient's condition was not so good, a second injection of 4000 units of antitoxin was given. It was hoped that the calcium lactate would counteract any untoward symptoms the antitoxin might produce.

The second injection was followed by the same symptoms as had occurred after the first but much milder in character. An urticarial eruption lasting for twenty-four hours also developed. It was afterward learned that this patient was subject to attacks resembling hay fever when around horses. These asthmatic attacks ceased after the injections of antitoxin.

Bacon and Williams believe that the calcium lactate had some influence in lessening the severity of the second attack. Eighteen months ago I undertook some experiments to see whether calcium lactate would have any effect in preventing anaphylaxis. A number of guinea-pigs were sensitized with horse serum and then given varying amounts of calcium lactate for several weeks. When the animals were reinjected no difference could be detected between the controls and the calcium lactate animals. They all developed the usual phenomena seen after a second injection and died. It is also possible that in Bacon and Williams' case the milder symptoms occurring after the second injection were, in a measure, due, the individual having had a previous attack. In animals an attack of anaphylaxis with recovery seems to immunize the animal against future attacks.

Antimeningitic Serum. Koplik¹ reviews his experience with the various methods of treating *cerebrospinal meningitis*. He first directs attention to the variability of the disease as regards the severity of the symptoms. "In the sporadic form cerebrospinal fever is an affection at times so mild as to give few symptoms of a critical nature. At other times in the sporadic form the disease takes on a severer type, and then the picture closely resembles what is seen in epidemics of the disease. In a word, cerebrospinal meningitis of the meningococcic type very much resembles pneumonia as it is seen in adults in the sporadic and epidemic forms."

From 1899 to 1903 Koplik treated 21 sporadic cases. Of these 21

¹ Medical Record, October 3, 1908.

cases, 8 died, a mortality of 38 per cent.; of the 8 fatal cases, 6 were below one year of age, thus indicating that in the sporadic form the disease was most fatal among infants below one year of age. Considering the cases over two years of age alone, there were but 2 deaths, a mortality of 13 per cent.

It will be recalled that in 1904 and 1905 New York City suffered from an extensive epidemic of cerebrospinal fever. During these two epidemic years Koplik had under his care 74 cases; of these, 51 were over two years of age and 23 were under two years of age. The total mortality for the 74 cases was 50 per cent.; for the 51 cases over two years of age, 31 per cent.; of the 23 under two years of age, 78 per cent. died outright, and the remainder were unimproved—that is, those who were discharged with incurable hydrocephalus, idiocy, and marasmus, and which might be considered as practically fatal sooner or later.

These two groups of cases (one sporadic and one epidemic) were treated by lumbar puncture. If there was delirium, high fever, with the development of the signs of fluid in the ventricle, as evinced by the MacEwen sign, lumbar puncture was performed. If the symptoms did not abate, the fever continued, as well as the delirium, and the MacEwen sign persisted, the patient was again punctured. According to the necessity of the case the puncture was repeated in some instances from two to five times.

Koplik points out that a study of these two sets of statistics, one of the sporadic cases of cerebrospinal meningitis and the other of the epidemic form, shows that in the sporadic cases four children below two years of age were saved by simple lumbar puncture, while in the epidemic cases none recovered.

If the cases under two years of age are deducted, both from the sporadic and epidemic forms of the disease, there is left 15 cases of the sporadic type, with a mortality of 13 per cent., and of the epidemic type, 51 cases, with a mortality of 31 per cent.

Koplik has had, in addition to the cases above mentioned, 13 treated by serum. The serum cases were treated exactly as the others except for the addition of the serum to the therapy. These cases Koplik considers to be of the sporadic type, although one or two of them approached in severity what is seen during epidemics—the foudroyant symptoms, the hemorrhages, the rapid collapse and sinking of the patient at the start of the disease.

The ages of the serum-treated patients varied from three and one-half months to eleven years; three were below one year and three were two years of age or younger (a total of 6 two years or younger).

Koplik's results in these 13 cases were: Two still under observation at the time of writing, and two deaths; the remainder recovered with the exception of one, which was discharged improved.

“I think it would be rather premature and unfair in every way to draw

any conclusions as to the serum until we have seen a larger material and until we have tried it in an epidemic of the violent type, such as we passed through in 1904 and 1905. On the other hand, it may be said that the serum of Flexner not only makes a very favorable impression, but is certainly a factor which cannot be excluded from the therapy of cerebrospinal meningitis, no matter what our subsequent conclusions may be. It certainly does appear that with the serum as we perfect it we may have an improvement in the percentage of recoveries. It is hard to say sincerely whether taking the cases I have treated I shall continue to have the same good fortune to save all but two cases of thirteen. Even if the cases I have lost were below one year of age, judging from the results obtained elsewhere, we may still meet with cases which we cannot save by the serum, and it would certainly be very unreasonable to expect a continuance of such a very high percentage of recoveries as we have just shown."

I have arranged in tabular form the results reported by Holt¹ in the treatment of cerebrospinal fever with antimeningitic serum:

Age.	Cases.	Per cent.
Under 2 years	59	42.4
From 2 to 5 years	88	28.4
From 5 to 10 years	104	15.4
From 10 to 20 years	149	27.5
Over 20 years	123	39.0

Time of injection.	Age.	Per cent.
First three days	{ Under 2 years	9.0
	{ 2 to 5 years	22.8
	{ 5 to 10 years	12.3
	{ 10 to 20 years	24.0
	{ Over 20 years	44.5
Fourth to seventh day	{ Under 2 years	21.1
	{ 2 to 5 years	32.5
	{ 5 to 10 years	12.2
	{ 10 to 20 years	24.0
	{ Over 20 years	37.0
After seventh day	{ Under 2 years	71.4
	{ 2 to 5 years	27.0
	{ 5 to 10 years	22.0
	{ 10 to 20 years	36.6
	{ Over 20 years	36.6

It will be recalled that the statistics of Flexner and Jobling² showed very clearly that the earlier the serum was administered the higher was the percentage of recoveries. In the figures just quoted from Holt, it is interesting to note that the mortality in children under two years of age,

¹ Journal of the American Medical Association, February 6, 1909, p. 496.
² PROGRESSIVE MEDICINE, December, 1908, p. 262.

when injected in the first three days, was only 9 per cent., while in children of the same age, when injected after the seventh day, the mortality rose to 71.4 per cent. Infants, as Koplik¹ has pointed out, give a very high mortality even in the sporadic form of the disease. This is also borne out by the figures presented by Holt in the first table. Of 59 cases under two years of age, 34 recovered and 25 died, a mortality of 42.4 per cent.

Churchill² has treated 29 bacteriologically proved cases, of which 16 recovered and 13 died, a mortality of 44 per cent. Of 16 patients receiving the serum within the first week, but 6 died, a mortality of 37 per cent. Of these 6 cases, 3 were fulminating and died within the first two days; 1 was a bartender, aged forty-three years, and the other 2 were not closely followed up, each receiving but one dose of the serum.

Churchill attributes the comparatively high mortality in this small series, when compared to the larger collective statistics of Flexner and Jobling, to the fact that many of these cases were treated in their homes, at widely separated points. Much better results were obtained in the patients treated in the hospital, where they can be more closely watched and studied. The importance of having the serum administered by experienced hands and under favorable conditions is also commented on by Koplik.³

Currie and MacGregor⁴ have had under their care at the Glasgow Fever Hospital, from May, 1906, to May, 1908, 330 cases of cerebrospinal fever. Of these 330 cases, 105 were treated with antimeningococcic serum; 66 of the 105 died, a mortality of 62.7 per cent. Of 225 cases not treated with serum, 181 died, a mortality of 80.4 per cent.

Flexner⁵ has just reported on 712 cases of cerebrospinal meningitis in which the bacteriological diagnosis was made and the serum treatment used. This report, in common with those previously made by Jobling and himself, is characterized by the same conservative conclusions. He points out that the cases in which the serum was first employed in this country represented those occurring during the period of recession of the epidemic and, therefore, of a less virulent nature. This is also true of the cases treated in Germany. In the epidemics in Belfast and Edinburgh the serum was first employed during the height of the epidemic, from which the disease was tending to recede in virulence. The evidence at hand, however, shows that in these epidemics the disease had not diminished in virulence and fatality, although the number of cases appearing in a given time was less than before.

In France, on the other hand, the serum has been available from the very beginning of the outbreak of cerebrospinal meningitis. Flexner states

¹ Loc. cit.

² Journal of the American Medical Association, September 11, 1909.

³ Loc. cit.

⁴ Lancet, October 10, 1908.

⁵ Journal of the American Medical Association, October 30, 1909.

that already there have been reported 100 or more serum-treated cases from France, in which the mortality will probably be less than 25 per cent. The serum used in France was supplied by the Rockefeller Institute. It is also interesting to note that the Institute has sent supplies of serum to India and Jerusalem. No reports have as yet been received from the last-mentioned places.

The following table shows the mortality during the different age periods:

CASES ANALYZED ACCORDING TO AGE GROUPS.

Age.	Cases.	Recovered.	Died.	Per cent.
1 to 2 . . .	104	60	44	42.3
2 to 5 . . .	112	82	30	26.7
5 to 10 . . .	113	95	18	15.9
10 to 15 . . .	101	73	28	27.7
15 to 20 . . .	107	72	35	32.7
20+ . . .	175	106	69	39.4
Total all ages	712	488	224	31.4

This table shows that the greatest mortality is in the first two years of life; a fact also pointed out by Koplik¹ in the analysis of his cases.

In former papers Flexner and Jobling have shown that the earlier the serum is administered the better the results. This is again strikingly emphasized by the following table from Flexner's paper:

CASES ANALYZED ACCORDING TO DAY OF INJECTION.

Age.	First to third day.			Fourth to seventh day.			Later than seventh day.		
	Rec.	Died.	Per cent.	Rec.	Died.	Per cent.	Rec.	Died.	Per cent.
1 to 2 . . .	16	1	5.8	22	10	31.2	22	33	60.0
2 to 5 . . .	24	6	20.0	40	12	23.0	18	12	40.0
5 to 10 . . .	43	8	15.6	35	6	14.6	17	4	19.0
10 to 15 . . .	36	8	19.0	23	9	28.1	14	11	40.0
15 to 20 . . .	25	17	40.4	25	8	24.2	22	10	31.2
20+ . . .	36	21	36.8	34	24	41.3	36	24	40.0
Total	180	61	25.3	179	69	27.8	129	94	42.1

Flexner states that the discrepancy occurring in the two highest age periods cannot be wholly accounted for at present. The explanations which suggest themselves are that among older individuals there tends to be a large number of very severe, rapidly fatal or fulminating cases of the disease, or that older persons are less subject to the beneficial action of the serum. He states, however, that in actual practice adults may respond promptly to the serum injections by abrupt termination of the disease or ameliorated symptoms and pathological conditions.

Owing to the extremely favorable results obtained in cases injected at the onset of the disease, Flexner urges an exploratory lumbar puncture

¹ Loc. cit.

in all suspicious cases, in order that the *Diplococcus intracellularis* may be searched for. The organism is sometimes found in cases in which the spinal fluid is clear.

Rotch,¹ in discussing Flexner's paper, spoke most favorably of his experience with the serum. The following chart taken from his discussion gives in graphic form a better idea of the results obtained since the introduction of the serum than the recital of figures:

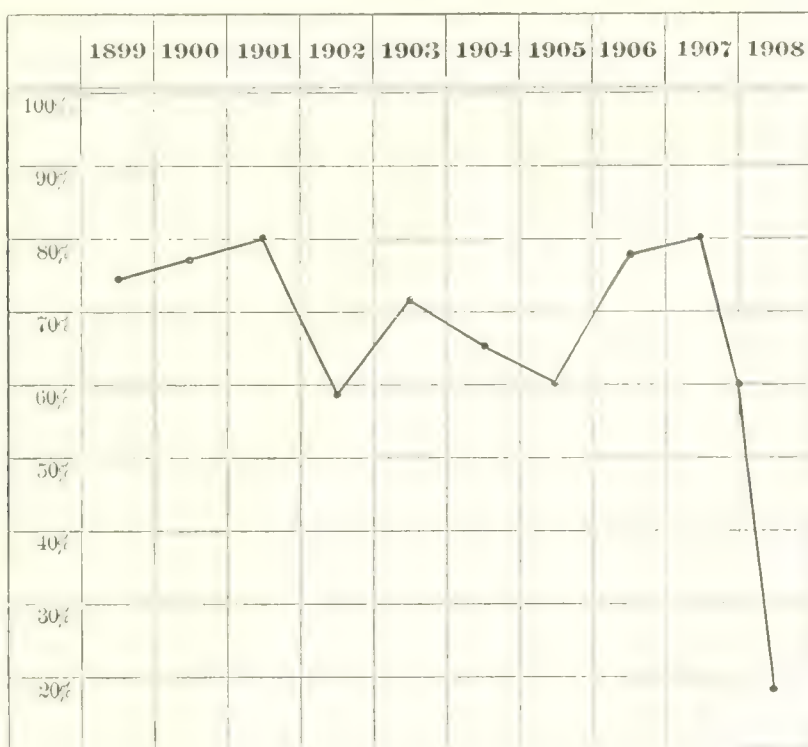


FIG. 36.—Chart showing death rate from epidemic cerebrospinal meningitis at the Children's Hospital, Boston, from 1899 to 1908.

A single case of recovery from the use of serum is reported by Mayer.²

The method of administering the serum is important, and the success of the treatment is, in a measure, dependent on the care with which it is done. All are agreed that the serum to be of service must be brought into direct contact with the invading cocci. This can only be done by lumbar puncture; subcutaneous administration is useless.

Churchill³ advises that in all cases clinically resembling cerebrospinal fever a lumbar puncture be done. For performing the puncture, a large antitoxin syringe or a large aspirator may be used. The syringe should hold at least 30 c.c., and both the instrument and the patient be surgically clean. The serum, heated to body temperature, should be in readiness for immediate injection. The puncture is made in the third or fourth lumbar space, close to the spine, this point being determined by an imaginary line running from crest to crest of the ilia. When the needle reaches the spinal canal the fluid begins to flow out.

¹ Journal of the American Medical Association, October 30, 1909, p. 1444.

² Münchener med. Wochenschrift, May 4, 1909.

³ Loc. cit

The pressure of the fluid should be noted if possible with the sphygmomanometer or roughly by counting the number of drops per minute; its turbidity and color should also be noted.

A few drops of the fluid should be collected on clean glass slides for immediate examination, and several test tubes should be inoculated by allowing the fluid to trickle directly over the media, for further examination. Evacuate, if possible, from 30 to 45 c.c. of spinal fluid. The serum is at once injected if the fluid is turbid or cloudy without waiting for an examination of the smears. To inject the serum, attach the syringe to the needle, already in place, and by gentle pressure force down the piston. The amount injected should equal the amount withdrawn, except when the amount of spinal fluid evacuated is less than 30 c.c., when 30 c.c. of serum is always given. In small babies it may be desirable to give smaller amounts. In very severe or fulminating cases, Dunn¹ advises a dose of 45 c.c. if the amount withdrawn is between 30 c.c. and 45 c.c. Churchill lays down the following rules regarding the repetition of the serum: If the bacteriological examination shows the presence of the diplococcus, subsequent injections of the serum should be given. Formerly it was the custom to wait, if improvement followed the first injection, until unfavorable symptoms developed, namely, increased temperature, great restlessness, pain, headache, etc., and then give a second dose. Increased experience, as Dunn² has pointed out, has demonstrated that better results are obtained by repeating the injection for three or four successive days regardless of how well the patient does. In fulminating cases the dose (45 c.c.) should be repeated in from twelve to eighteen hours. The serum does no harm, and by repeating the dose the diplococci are prevented from increasing and causing a recurrence of the symptoms. After the first series of doses an interval of several days is allowed, when, if untoward symptoms arise, from two to four more injections are given, depending on the severity of the symptoms.

After the symptoms have disappeared a lumbar puncture is done for the purpose of seeing whether the spinal fluid still contains organisms. As a rule, the diplococci disappear early. If, however, they persist for a long time, serum should be injected from time to time until the fluid is at last found to be sterile. Relapses should be treated as fresh cases.

Churchill mentions one case in which a severe arthritis was shown, by bacteriological examination, to be due to the meningococcus. The joint was aspirated and three injections of 15 c.c. of serum injected directly into the joint. The relief to the pain was immediate and apparently a perfect recovery took place. He refers to a similar case reported by Cushing.

Instead of using a syringe for introducing the serum, Koplik³ advises

¹ Boston Medical and Surgical Journal, December 3, 1908.

² Loc cit.

³ Loc. cit.

the use of a small glass funnel. This method, he believes, is gentler and safer than the syringe, as it is incapable of producing traumatism from overpressure, such as might result from pressing the piston of the syringe too forcibly.

It is now fully recognized that antimeningitic serum must be brought into direct contact with the meningococci in order to be of service. Knox and Sladen¹ have called attention to the fact that the lateral ventricles of the brain may harbor the meningococcus, and that these organisms may persist and develop in this site even after they have died out in the spinal subarachnoid space. Being out of reach of the spinal lumbar puncture, they may continue to exist and thus cause relapses or lead to inflammation, causing hydrocephalus and death. This fact raises the question of whether in the acute stages of persistent and relapsing cases the withdrawal of fluid from and the injection of antimeningitic serum into the lateral ventricles should not be attempted. Cushing and Sladen² report a case in which large numbers of meningococci abounded in the fluid of the lateral ventricle after the spinal fluid had become sterile and in which they injected the serum into the ventricle.

Antitetanic Serum.³ In spite of the wide publicity which has been given to the cause and prevention of tetanus, especially during our annual Fourth of July celebrations, each year sees a repetition of the same dreadful tragedies. The primary cause of our Fourth of July fatalities is the laxity of the municipal authorities, for so long as the public is allowed to employ blank cartridges, giant crackers, etc., just so long will these accidents occur. It is interesting to note that in those communities which prohibited the sale of these articles, accidents were reduced during the last year to a negligible quantity, while in those places in which the practice of celebrating the Fourth in the old way obtained, the usual quota of deaths and accidents of a more or less serious nature occurred. The correction of this phase of the subject lies not with the medical press, but with the lay press; the former has pointed out the necessity of action, but it rests with the latter to secure the necessary legislative enactments.

That there is urgent need of action is shown by the accompanying tables compiled by the *Journal of the American Medical Association*.

In Table I is recorded the number of deaths from tetanus, and the exciting causes, from 1903 to 1909. It will be seen that the recent Fourth furnished almost twice as many deaths as that of last year and the year before. This may be due, as the *Journal* suggests, to the fact that the celebration this year was spread over three days, since the Fourth came on Sunday. It is also possible that the agitation of the last few years has led to more cases being reported.

¹ Archives for Pediatrics, 1908, vol. xxv, p. 761.

² Journal of Experimental Medicine, 1908, vol. x, p. 548.

³ Journal of the American Medical Association, September 18, 1909; special article, p. 948; Editorial articles, pp. 954, 955.

TABLE I.—*Causes of Tetanus Cases*

Year.	Blank cartridge.	Giant cracker.	Cannon.	Firearms.	Powder, etc.	Total.
1903	363	17	5	3	27	415
1904	74	18	5	1	7	105
1905	65	17	4	5	13	104
1906	54	17	1	7	10	89
1907	52	8	6	4	3	73
1908	58	5	4	3	6	76
1909	130	9	1	4	6	150

Table II shows the number of deaths which occurred from causes other than tetanus.

TABLE II.—*Causes of Deaths Aside from Tetanus.*

Year.	Gunshot.	Fire from fireworks.	Powder, torpedoes, etc.	Giant crackers.	Cannon.	Other causes.	Total.
1905	37	23	6	5	7	17	95
1906	38	18	18	3	3	3	83
1907	20	31	13	13	3	22	102
1908	30	22	19	23	7	7	108
1909	17	37	16	7	7	6	90

These tables illustrate the dangers so clearly that further comment is unnecessary.

It must also be admitted that in some instances death from tetanus occurs through lack of proper treatment. "In several instances, according to report,¹ doctors still resorted to the old methods of treatment long known to be of little value. Several instances were reported also in which doctors did not lay open the wounds until after tetanus had developed, and, therefore, too late to be effective. In some instances the later operation revealed embedded in the wound the wad which should have been removed at the first treatment."

Although the treatment of Fourth of July injuries has been set forth in detail in previous numbers of *PROGRESSIVE MEDICINE*, it may be well to repeat the following brief and concise rules laid down by the *Journal of the American Medical Association*:

To Prevent Lockjaw. 1. Freely incise every wound.

2. Carefully and thoroughly remove from the wound every particle of foreign matter.

3. Cauterize the wound thoroughly with a 25 per cent. solution of phenol (carbolic acid).

4. Apply a loose wet boric acid pack.

5. Inject subcutaneously 1500 units of antitetanic serum.

6. In no case should the wound be closed. It should be allowed to heal by granulation. The dressing and packing should be removed every day.

¹ *Journal of the American Medical Association*, September 18, 1909; special article, p. 948; Editorial articles, pp. 954, 955.

While tetanus antitoxin should be used in all cases, whether for prophylactic or curative purposes, it should be borne in mind, especially in those cases before the disease has occurred, that the important factors in the treatment are free incision, thorough cleansing of the wound, and free drainage. These measures are often sufficient, and should be scrupulously carried out if there is no opportunity given to obtain the antitoxin.

In addition to the 150 cases of tetanus following Fourth of July injuries, the *Journal* has collected 128 cases in which tetanus followed penetrating injuries from nails or splinters, crushing injuries, or other causes. The necessity of treating all such injuries, especially when contaminated with street dirt, is not fully appreciated. Last year¹ I mentioned the experience of Brandenstein, who stated that it is the rule in the hospital with which he is connected in Berlin to give prophylactic injections in all cases of wounds soiled with garden or street dirt or horse manure, or made by splinters, bullets, or freezing. In most cases the injuries were from being run over by vehicles. Since adopting this rule tetanus has never developed in any case receiving prophylactic injections. For some years past Finney has been pursuing the same plan in the Surgical Clinic of the Johns Hopkins Hospital.

Recently the Society of Surgery of Paris² reported that in a group of Paris hospitals there had occurred in the last seven years but eleven cases of tetanus, all of which were in persons who by some mischance had not received the customary preventive dose of antitetanus serum, which is the routine practice after a street accident.

Kocher³ has also insisted on the necessity of treating every wound contaminated with street dirt with prophylactic doses of antitetanus serum.

The same rules hold good for these cases as in Fourth of July injuries. If the tetanus antitoxin is not available, open the wound thoroughly to permit of free drainage, curette and cauterize with 25 per cent. phenol. It is hardly necessary to state that these measures should be carefully carried out even when the antitoxin is employed.

In an editorial article⁴ the *Journal of the American Medical Association* calls attention to some of the misconceptions regarding tetanus antitoxin, and gives the present status of the serum as a prophylactic and a curative agent. The prophylactic use of tetanus antitoxin was first demonstrated by veterinarians.

The results obtained in horses, which are much more subject to tetanus than man, are striking. Thus, Vaillard⁵ states that in a series of 13,124 prophylactic injections in horses, not one has contracted tetanus.

¹ PROGRESSIVE MEDICINE, December, 1908, p. 270.

² Editorial of Journal of the American Medical Association, September 18, 1909.

³ Ibid.

⁴ Ibid.

⁵ Bul. Acad. Méd., 1908, vol. lxxii, p. 581; Editorial of Journal of the American Medical Association, September 18, 1909

In man the results have been almost equally favorable. Suter¹ has collected 700 cases in which but one light attack of tetanus was observed among all the patients given antitoxin.

A few cases have been reported² in France, in which tetanus has developed even after the use of serum, but an analysis of these cases show that in some the interval between the time of infection and the time of injection of the antitoxin had been too long; in a few there was reason to believe that the antitoxin was inactive, and in a few antitoxin powder had been used. An additional factor is suggested by Vaillard,³ namely, that the serum protects against the toxin for only about one week, therefore in some cases spores which have not been removed later produce sufficient toxin to cause a mild tetanus.

This last-mentioned factor emphasizes the necessity of thorough cleansing methods in the primary treatment of the wound.

"To put the matter in a nutshell, it may be stated dogmatically that the value of tetanus antitoxin as a prophylactic agent is very great, and its efficiency nearly absolute."

In regard to the curative properties of tetanus antitoxin once the disease is established, the results are not nearly so favorable. To state that antitoxin is useless once tetanus has developed is not correct. The serum should always be employed, because, high as the mortality in acute cases is, even with its use, it offers a better chance for recovery than anything else we have.

Hoffman⁴ has reported a series of 13 cases with 58 per cent. mortality in which the antitoxin was used subcutaneously. In another series of 16 cases, in which the serum was administered by intradural injections, only 2 died, and these from complications. Pancrazio⁵ has also found injection of the antitoxin directly into the spinal canal the most efficient method of administration. I have been unable to see the original of either of these communications so I am unable so state whether the cases were acute (developing within seven or eight days) or chronic. It is well known that acute tetanus furnishes the large majority of the deaths, and that chronic tetanus frequently is recovered from under many different methods of treatment.

Several very instructive reports, bearing on this aspect of the subject, were given in *PROGRESSIVE MEDICINE* for December, 1908, p. 2691, and which may well be repeated:

"Our helplessness in dealing with tetanus that has once developed, particularly the type with an incubation period of less than seven days, is illustrated in the following reports: Brandenstein reports 24 cases of traumatic tetanus and 2 of local tetanus, with a mortality of 823 per

¹ Journal of the American Medical Association, September 18, 1908.

² See *PROGRESSIVE MEDICINE*, December, 1908, p. 268.

³ *Ibid.*

⁴ Editorial of Journal of the American Medical Association, September 18, 1908.

⁵ *Gazzetta degli Ospedali*, September 27, 1908.

cent. Serum was used in 20 cases, and of these, 4 recovered, while of 6 cases not receiving serum, all died. Bockenheimer reports 29 cases occurring in von Bergmann's clinic during the last twenty-five years. The mortality in their series was 86.2 per cent. Three of 20 cases receiving serum recovered.

"Fricker reports 40 cases. Of these cases, 18 occurred before the advent of the antitoxic serum; 16 died and 2 recovered. Of 22 cases cases treated with serum and other measures, 10 recovered and 12 died. The second series, however, contained a greater number of mild or moderately severe cases, which Fricker believes should be taken into consideration before attributing too much to the serum. *In addition, energetic local treatment (curetting, etc.) was employed in the second series.*

"The most important conclusion to be drawn from these reports is that when recovery occurs from tetanus it is almost always in the cases with a long incubation period and mild or moderately severe manifestations. Brandenstein states that all his cases with an incubation period of less than eight days died, and Bockenheimer had the same experience."

A single case of acute tetanus (incubation period six days), with recovery after large doses of antitoxin and chloral and bromide of potassium, is reported by Harvey.¹

I have gone into the subject at some length in order to emphasize the importance of giving all wounds suspected of harboring the tetanus bacillus the most thorough local treatment in addition to the injection of antitoxin.

Aperitol is a white, tasteless, insoluble powder made by combining isovalerianic acid with phenolphthalein. It is claimed for this new compound that it has all the desirable features of phenolphthalein without producing the griping and pain that sometimes attends the latter. The dose is from 3 to 10 grains in tablet form.

Herschell² has found the drug very satisfactory. It produces stools with a large increase in the watery contents, and for this reason may be employed in cases of ascites, pleurisy with effusion, some forms of obesity, and heart disease. Because of its mildness of action and absence of discomfort the drug may be serviceable as an occasional aperient for children.

Apomorphine. In *PROGRESSIVE MEDICINE* for December, 1907, p. 270, Rosenwasser's article on the use of apomorphine in *acute alcoholism* was mentioned. Roseburgh³ also recommends the drug in this condition. He administers the drug hypodermically, in doses of from $\frac{1}{30}$ to $\frac{1}{20}$ of a grain. No matter how wild or noisy the patient is, he usually falls asleep in about ten minutes. The sleep may last ten or twelve hours. Roseburgh states that apomorphine in doses of $\frac{1}{30}$ to $\frac{1}{20}$ grain acts as promptly as a hypnotic as an emetic in doses of $\frac{1}{10}$ grain.

¹ Therapeutic Gazette, May, 1909.

² Folia Therapeutica, April, 1909.

³ Canadian Practitioner, October, 1908.

Rosenwasser¹ stated that the drug should not be given by mouth in these cases, as its action is very uncertain. One of the great advantages claimed for it in alcoholics is that it can be given hypodermically without objection on the part of the patient when he will obstinately refuse to take medicine by mouth.

Hornack² points out that occasionally very marked untoward effects may follow the use of apomorphine for emetic purposes.

In order to rid himself of a foreign body he had inadvertently swallowed, Hornack gave himself 10 mg. ($\frac{1}{6}$ grain) of apomorphine hypodermically. Vomiting occurred in a few minutes. In addition, all the voluntary muscles became so relaxed that he was unable to move. Consciousness remained and the respiration was unaffected. Extreme weakness persisted for several days. He cites another instance in which 13 mg. ($\frac{1}{5}$ grain) injected into an individual in a weak state of health produced alarming symptoms of acute apomorphine poisoning. In this case, in addition to the distressing weakness, the respirations became irregular.

Hornack states that crystallized apomorphine is free from any paralyzing action on the respiratory centre, and is the only form in which the drug should be employed in therapeutics.

Atoxyl. The use of this new arsenical compound in the treatment of trypanosome infections was mentioned in last year's review.³ The use of the drug in the treatment of *trypanosomiasis* originated with Thomas in 1905, and Koch's experience with the drug in the treatment of the *sleeping sickness* has furnished us with much information as to the efficiency of the treatment, the length of time necessary to achieve a cure, the dosage and the dangers of atoxyl. In Koch's experience the drug must be administered over a long period of time (four to six months).

He administered the drug hypodermically in doses of 0.5 gram ($7\frac{1}{2}$ grains) on two successive days; an interval of ten days follows, and the atoxyl is again injected. Given by mouth the drug gave but indifferent results.

Although atoxyl was originally believed to be non-toxic, it is now recognized that in large doses blindness, which is permanent, sometimes occurs. Salmon, who is an enthusiastic advocate of atoxyl, cautions against employing it if there is reason to believe that there is disease of the retina or optic nerve. In some of Koch's patients blindness developed when the dose was increased beyond $7\frac{1}{2}$ grains. So long as the dose did not exceed this amount there was no trouble.

Igersheimer⁴ has carried out some experiments in order to determine the cause of this *atoxyl amblyopia*. He applied the drug directly to the eyes of 11 rabbits, 7 dogs, and 7 cats. He noted the following changes: (1) Introduction into the anterior chamber causes no permanent lesion,

¹ Loc. cit.

² Münchener med. Wochenschrift, September 8, 1908.

³ PROGRESSIVE MEDICINE, December, 1908, p. 271.

⁴ British Medical Journal, December 12, 1908.

but a milligram introduced into the anterior chamber causes a violent reaction. A tenth of a milligram causes no macroscopic changes in the vitreous, but eventually causes a degeneration of the nerve cells and of the optic nerve. (2) Subcutaneous injection of atoxyl causes in the cat lethargic movements, ataxia, tetanic spasms, conjunctivitis, lesions of the ganglion cells, and especially of the optic nerve. In the optic nerve Marchi's reaction can be obtained, and changes are present characterized by an intense coloration of the neuroglia. Igersheimer was unable to determine whether these changes were primary in the optic nerve or whether secondary to more intense central lesions.

Key¹ has also made some clinical and experimental studies on the effect of atoxyl on the eye. He concludes that the drug has a treacherous toxic action in the organism the most prominent action being the production of amblyopia. He states that this amblyopia is the result of optic nerve atrophy, with primary involvement of the retina, though in certain cases central lesions, shown experimentally and apparent clinically, are very suggestive.

Terry² has reviewed the various uses of atoxyl. Of special interest is the part relating to the use of the drug in the treatment of *syphilis*.

Experimentally it has been shown that syphilis may be aborted by the prompt use of atoxyl. In order to accomplish this, however, the atoxyl must be administered prior to the appearance of the primary lesion. According to Salmon, at the moment the initial lesion appears the infection seems to become definitely chronic, and the necessary doses of atoxyl must be repeated for a long time to effect a cure.

That the disease is definitely aborted if used prior to the appearance of the primary sore is shown by an experiment of Metchnikoff's. Two monkeys, previously protected from infection by atoxyl, were inoculated a second time with syphilitic virus, seventy-seven and ninety-one days respectively, after the first inoculation. Both animals developed characteristic primary lesions. To effect a cure the drug must be continued for some time. Just how long this time should be Terry is unable to state. The continued observation of many cases alone will decide this. As the disease is chronic the drug must doubtless be continued for months.

In man the drug has been used prophylactically in two cases reported by Metchnikoff. As it could not be determined whether either one had definitely contracted the disease, Metchnikoff was unable to draw any definite conclusions.

In support of the efficiency of atoxyl in combating syphilis in man, Terry quotes the following opinions: Clinically the action of arsenic is comparable to that of mercury (Salmon). It cures the lesions that mer-

¹ University of Pennsylvania Medical Bulletin, June, 1909.

² Archives of Internal Medicine, March 15, 1909.

cury cures (Salmon). It is the third specific (Hallopeau). Toward it all of the syphilides react in the same way (Salmon). The chancre heals rapidly (Salmon). Exanthemata disappear, papules flatten, annular syphilides dry, ulcers heal, and gummata yield to its influence (Lassar).

Salmon advises the following method of administration: The dose should not exceed 0.5 gram ($7\frac{1}{2}$ grains). Given in larger doses, there is danger of permanent blindness or intense intoxication, or both. This danger was also noted by Koch in the treatment of the sleeping sickness. Salmon administers the drug subcutaneously or intramuscularly in aqueous solutions of from 10 to 15 per cent. sterilized at 100° C. for two minutes. As the aqueous solution does not keep, it is best to prepare it fresh before using.

Salmon has made 1349 injections in 181 patients without producing ocular trouble.

In spite of the enthusiastic opinions just quoted, it is doubtful whether atoxyl will have a wide field in the treatment of syphilis. The efficiency of mercury and the iodides is too well proven. There are two groups of cases, however, in which the drug may prove of value: (1) Those patients who manifest an idiosyncrasy toward mercury and the iodides. In such individuals atoxyl should be used. (2) It not infrequently happens that patients reach a stage where improvement ceases, even when the mercury is well borne. Under these circumstances atoxyl may be used for a time. In actual practice Salmon has found this alternating treatment very effective against lesions that have grown torpid or refractory when treated with atoxyl or mercury alone. Salmon has also given the atoxyl and mercury simultaneously. This method has not produced any untoward effects; its exact value remains to be seen.

Charmeil, Bertin, and Poiteau,¹ after an experience with atoxyl in the treatment of syphilis, are in agreement with the conclusions just given, *i. e.*, that while the drug may be of value in certain cases, there is no reason to think it will ever supplant mercury and the iodides.

It must be remembered that there is a certain proportion of individuals who cannot take atoxyl. The symptoms of intolerance are manifested by colic, nausea and vomiting, headache, dyspnea, and anxiety. These symptoms develop about ten hours after the injection of the drug, sometimes after the first, but more frequently after the fourth injection. The symptoms last about four hours and are more alarming than serious. According to Salmon they are allayed by opium. Ocular symptoms rarely occur unless the dose is large. In both Salmon's and Koch's experience ocular disturbances never occurred in doses of 0.5 gram or less.

Schlecht,² who has reported a fatal case of poisoning from atoxyl, is strongly opposed to the use of the drug in syphilis, blood diseases, and skin lesions for which other methods of treatment are available. When

¹ British Medical Journal, March 6, 1909.

² Münchener med. Wochenschrift, May 11, 1909.

employing atoxyl, idiosyncrasy on the part of the patient must be kept in mind and extreme caution used.

Schlecht's patient was a man, aged twenty-eight years, suffering from syphilis. He was first treated with mercury, first by inunctions for three weeks, and later he received four injections of the salicylate of mercury. Six days after the last mercury injection he was given atoxyl in four separate doses of 0.6 gram (9 grains) over a period of eight days, the total quantity being 2.4 grams (36 grains).

The day after the last injection the patient became seriously ill with malaise, anorexia, vomiting, and sudden rise in temperature. A few hours later epileptiform convulsions occurred, with tonic and clonic spasms and loss of consciousness. The pupils were sometimes contracted and sometimes dilated. The reflexes were at first abolished, but later became exaggerated and a Babinski reflex was obtained on both sides. Cyanosis was marked; respiration was sometimes deep and sometimes superficial. The heart action was weak and the pulse small and feeble.

The urine contained both albumin and casts. Examination of the blood showed a marked leukocytosis and some polycythemia.

The autopsy showed degenerative changes in the heart muscle, edema of the lungs, fatty and necrotic areas in the liver, with marked destruction of red blood cells both in the liver and spleen. The kidneys were large, soft, flabby, and congested. In the central nervous system local proliferations of the neuroglia in the cortex and recent degenerative changes in the vessels were observed. The dose (9 grains) employed in this case was too large, exceeding the limit of safety ($7\frac{1}{2}$ grains) set by Salmon and Koch.

Hartzell¹ has employed atoxyl in 8 cases of *psoriasis* and in 1 case of *pemphigus*. He used a 10 per cent. solution in doses of from 25 to 30 minims, injecting the drug into the gluteal muscles at intervals of two or three days. The greatest number of injections given any one case was twenty-seven, the treatment extending over a period of two months. The only toxic symptoms noted in his series was marked tremor of the arms and legs in the case of pemphigus. These symptoms developed after 6 grains a day had been taken for six days; they promptly disappeared with the temporary suspension of the treatment.

Although Hartzell's results were very satisfactory, he does not believe that atoxyl possesses any therapeutic properties not to be found in arsenous acid, Fowler's solution, or the arsenate of soda. In his opinion the superiority of the drug over other forms of arsenic is due to its great solubility in water and its freedom from irritant properties, which enables one to administer it hypodermically, a method which usually gives better therapeutic results.

Vassal² states that atoxyl used alone does not exercise a specific action

¹ Journal of the American Medical Association, October 31, 1908.

² Philippine Journal of Science, February, 1909.

in *malaria*, but when used in combination with quinine it assists in bringing about a rapid improvement and hastens convalescence. In chronic forms of malaria associated with cachexia quinine in combination with atoxyl is more efficient than quinine alone.

Klemperer¹ reports excellent results in the treatment of *pernicious anemia* with *arsazetin*. *Arsazetin* or acetyl-atoxyl is a new form of arsenic introduced by Ehrlich. It is less toxic than atoxyl. The drug is given hypodermically in a 10 per cent. solution in doses of 2 grains, which may be gradually increased to 10.

Belladonna. It is well known that few drugs are so likely to produce symptoms of intolerance as belladonna. Some individuals are extremely susceptible to the drug even in very small doses, and cases are on record in which symptoms of poisoning have followed the application of a belladonna plaster. During the past year Voorhees² has reported such a case. Another instance of poisoning is reported by Freudenberg.³ In his case one drop of a 1 per cent. solution of atropine was instilled into the left eye, because of interstitial keratitis complicated by a posterior synechia. The instillations were made five times daily, and later reduced to 1 drop three times daily.

Marked symptoms of belladonna poisoning developed. This report is especially interesting because the patient was but eight years of age. Children, as a rule, bear the drug very well and in much larger doses, proportionately, than do adults.

Terray⁴ has found *atropine* most serviceable in the treatment of *asthma*. He uses the drug in the following manner: A pill containing $\frac{1}{16}$ grain is given for two or three days and then gradually increased to from four to six pills daily. When the maximum dose is reached the number of pills is then gradually reduced to one pill daily. He states that atropine will not only arrest an attack of asthma, but also prevent recurrence. He has never seen any ill effects from this use of atropine.

For the prevention and relief of *chordee*, Huhner⁵ has found nothing more effective than the following prescription recommended by Taylor:

R \bar{y} —Ex. belladonnae	gr. ij
Ex. opii aq.	gr. vj
M. et ft. suppos. No. vi.	

Huhner instructs the patient to insert one of these suppositories in the rectum three or four hours before retiring, one just before retiring, and one if awakened by the chordee during the night. This treatment either entirely prevents the occurrence of chordee, or if it does appear the pain

¹ Berliner klin. Wochenschrift, 1908, No. 52.

² Journal of the American Medical Association, November 14, 1908.

³ Ibid., April 10, 1909.

⁴ Medizinische Klinik, January 17, 1909.

⁵ Medical Record, January 23, 1909.

is not severe. As a rule, the chordee has entirely disappeared by the third night. The suppositories are to be dispensed with as soon as the chordee has disappeared or the pain is trivial in character. Hulmer states that these same suppositories may be used advantageously in cases of *acute prostatitis* and in *acute cystitis* associated with tenesmus and frequency of urination.

Benzoic Acid. Mummery¹ quotes W. D. Miller to the effect that the most efficient *mouthwash* contains either benzoic acid or salicylic acid. The following formulas are recommended:

One part of this wash added to nine parts of water and held in the mouth for one minute will effectively sterilize the oral cavity.

R _x —Saccharine	gr. x
Ac. benzoic	gr. xiv
Tr. krameria	f 5j
Ol. menth. pip.	ʒij
Ol. cinnam.	ʒij
Alcohol absol.	f 5j

The following also may be used:

R _x —Ac. benzoic	gr. xviiij
Tr. eucalypti	f 5iss
Alcohol absol.	f 5x
Ol. menth. pip.	ʒiv—M.

Sig.—A teaspoonful to half a glass of water.

For chronic septic gingivitis, such as occurs in *pyorrhea alveolaris*, the addition of *salicylic acid* is of advantage.

R _x —Ac. salicylici,	
Ac. benzoic	āā gr. xvj
Tr. krameria	f 5iss
Alcohol absol.	f 5j—M.

Sig.—A teaspoonful to a small wineglassful of water as a mouthwash.

Bismuth. Before the practice of administering large quantities of bismuth subnitrate to facilitate the taking of radiographs of the stomach and intestines, and more recently the injection of tuberculous sinuses with fairly large quantities, bismuth was regarded as a non-toxic substance, which could be taken, even in large doses, without producing any ill effects. But reports which have appeared during the past two years make it apparent that this practice is not without danger. At the present time two types of poisoning from bismuth subnitrate are recognized: (1) That which is known as nitrite poisoning, coming on, as a rule, very suddenly after the ingestion of a large dose of the drug. This form is characterized by a weak pulse, coldness of the body, dyspnea, cyanosis, and collapse.

¹ Practitioner, May, 1909.

Headache, fever, and delirium may also occur. Death may occur in this form. After death methemoglobinemia is found. A case of this type, reported by Böhme, was mentioned in *PROGRESSIVE MEDICINE* for last year.¹ (2) In the other form the symptoms are largely local, being confined to the gastro-intestinal tract, especially the mouth. Symptoms of a severe stomatitis appear, characterized by marked inflammation of the buccal mucous membrane, swelling of the gums, ulceration or croupous changes, salivation and loosening of the teeth. The tonsils and parotid glands may become swollen and painful. Blackish or greenish-blue deposits appear on the gums, at first punctate, but later they coalesce. The urine is diminished in quantity and contains albumin and casts. Mastication and swallowing are painful, and there may be nausea and vomiting and diarrhea. In this form there may also be fever, headache, and delirium.

Beck,² who introduced the method of injecting tuberculous sinuses with bismuth paste, has contributed a paper on the toxic effects of bismuth subnitrate. He refers to eight authentic cases of untoward effects which had occurred up to the time of his paper. His conclusions are as follows:

(1) Bismuth subnitrate administered by the stomach in small doses is harmless. (2) In the presence of certain bacteria or feces of children bismuth subnitrate will liberate nitrites, which will be absorbed by the intestines and eliminated by the kidneys, and if the production is faster than the elimination, methemoglobinemia will result. (3) In large doses by mouth it is liable to produce an acute nitrite poisoning, characterized by cyanosis, collapse, methemoglobinemia, and may terminate fatally. (4) Rectal injection of small doses of bismuth subnitrate may cause nitrite poisoning much quicker and more severe than when administered by mouth. (5) Children are more susceptible to nitrite poisoning due to administration of bismuth subnitrate. (6) Persons suffering with intestinal putrefaction are very susceptible to nitrite poisoning when bismuth subnitrate is injected into the bowels. (7) The bismuth injected into these sinuses, and encapsulated, will be gradually absorbed, and may be found in the liver, spleen, muscles, and intestines. (8) Characteristic symptoms of black borders of gums, ulcerations of mucous membranes, diarrhea, desquamative nephritis may appear several weeks following the injection of the paste. (9) After the injection of large quantities of the bismuth paste into suppurating sinuses, mild symptoms of nitrite intoxication may appear. (10) The acute nitrite poisoning is to be regarded as a distinctly separate affection from the more chronic bismuth absorption. (11) Radiographers should employ some other preparation of bismuth than the nitrate and refrain from injections of subnitrate into the bowels, especially if intestinal putrefaction is present.

¹ December, 1908, p. 305.

² Journal of the American Medical Association, January 2, 1909.

Eggenberger¹ reports a case in which he injected 450 grains of a 50 per cent. bismuth paste. At the end of six weeks a severe stomatitis developed. The abscess was reopened and the bismuth removed, but the boy developed symptoms resembling uremia and died. At autopsy punctate hemorrhages in the stomach and ulceration in the cecum were found.

Steinmann² is not favorably impressed with the injection of bismuth paste.

David and Kauffman³ have recently reported two cases receiving injections of bismuth paste. Both developed severe symptoms of bismuth poisoning characterized by a severe stomatitis. Nervous symptoms were also marked in both cases, one of which ended fatally. I have recently seen a case with symptoms very similar to those occurring in the patients seen by David and Kauffman. The case seen by me was that of a physician suffering from some obscure intestinal condition. Because of a watery diarrhea he had been taking small doses of bismuth subnitrate at frequent intervals before consulting anyone. I first saw him when he had been taking the bismuth mixture for at least two weeks. About ten days later, the bismuth having in the meantime been stopped, he developed a most intense stomatitis, characterized by much pain, inability to masticate, the formation of a thick tenacious mucus, and swelling and tenderness of the right parotid gland.

Later, he had almost complete suppression of urine, which on examination was found to contain large quantities of albumin and dark granular casts. The urine had been normal prior to the onset of the stomatitis. The patient died.

In view of this experience, I would hesitate to use the large doses recommended by Borghjaerg⁴ in the treatment of gastric ulcer. This author recommends 150 grains of bismuth subnitrate daily for gastric ulcer.

Because of the number of cases of poisoning that have followed the use of bismuth subnitrate in *x*-ray work, Lewin⁵ has experimented with other preparations. In his opinion the other salts of bismuth are just as toxic as the subnitrate. He found that ferric oxide was excellently adapted to the purpose, and, besides, was free from any untoward effects. Alexander⁶ also recommends the oxide of iron. Larger amounts are required than of the bismuth, but as the oxide is harmless no disturbances need be feared. Alexander gives the oxide in a little sugar of milk and pulverized chocolate; about 150 grams (4½ ounces) are needed.

¹ Zentralblatt f. Chirurgie, October 31, 1908.

² Münchener med. Wochenschrift, December 8, 1908.

³ Journal of the American Medical Association, March 27, 1909.

⁴ Ugeskrift f. Laeger; Journal of the American Medical Association, November 21, 1909.

⁵ Münchener med. Wochenschrift, March 30, 1909.

⁶ Deutsche med. Wochenschrift, May 29, 1909.

Calcium Salts. Last year¹ I called attention to the work of MacCallum and Voegtlin on parathyroidectomy and calcium metabolism. In a recent paper² these authors publish additional experimental work on the subject. It will be recalled that in the early days of thyroidectomy tetany not infrequently occurred. Later it was found that the tetany was dependent on the parathyroid glands, and that if these glands were removed, serious disturbances were brought about. While the entire mechanism of the parathyroid action has not been determined, its relation to tetany and the withdrawal of calcium from the tissues has been proved by the work of MacCallum and Voegtlin. In animals the increased elimination of the calcium can be shown in the urine and feces, and the nervous phenomena following this withdrawal can be checked by the intravenous injection or oral administration of calcium lactate.

The experimental work of MacCallum and Voegtlin has also been confirmed clinically, a recent example being furnished by H. B. Stone.³ In Stone's case, a girl, aged eighteen years, 30 grains of the calcium lactate was given subcutaneously in normal salt solution, and every four hours 10 grains of the drug were administered in milk through a nasal tube. The patient made a good recovery with no recurrence.

Kinnicutt⁴ reports an interesting case of tetany associated with dilatation of the stomach and stagnation of its contents, in which the severity of the tetanic symptoms were inhibited by the introduction of calcium salts directly into the blood stream. While it was apparent that the convulsions could be controlled by the continued administration of the calcium salts, it was equally apparent that unless the gastric stenosis was relieved the patient would die. Operation was decided against because of the patient's condition, and death occurred suddenly shortly afterward.

Kinnicutt emphasizes the following points: (1) The rapid and controlling effect of the soluble calcium salts on the tetanic convulsions. (2) The maintenance of this effect only by their continued use. (3) The comparatively slight effect of large infusions of salt solution, used alone. (4) The slight influence, if any, of parathyroid preparations given by mouth in controlling the hyperexcitability of the nervous system. The demonstration of the controlling influence of the soluble calcium on the characteristic symptoms of at least one important variety of human spontaneous tetany—the tetany of gastrectasis, with stagnating stomach contents—suggests a probable similar therapeutic value of these salts in other forms of the disease in human beings. (5) The occurrence of typical tetanic spasm in a case of gastrectasis with parathyroid bodies of normal anatomical structure—and presumably of normal functioning power.

¹ *PROGRESSIVE MEDICINE*, December, 1908, p. 277.

² *Journal of Experimental Medicine*, 1909, p. 118.

³ *Journal of the American Medical Association*, April 3, 1909.

⁴ *American Journal of the Medical Sciences*, July, 1909.

The employment of the calcium salts in a variety of conditions has been brought about by Sir Almroth Wright's suggestion that while a deficient blood coagulability may not lead to actual hemorrhages, there may occur "serous hemorrhages" or exudates, examples of which are urticaria, chilblains, edema of the hands and feet not due to circulatory or kidney lesions, and some forms of headache.

Luff¹ has employed calcium lactate in 121 cases of the various abnormalities just mentioned; 78 per cent. were cured, 9 per cent. considerably improved, while 13 per cent. received no benefit.

He states that the drug should be fresh, as it decomposes after long keeping. The solution should be clear or nearly so. If a white precipitate is present, it is an indication that the salt has undergone some change and should be discarded. He recommends the following formula:

R—Calcii lactatis	5ijss
Tincturæ capsici	ʒv
Aque chloroformi	f ʒv—M.

Sig.—A tablespoonful in water three times daily, one hour before meals.

Luff advises the administration of the drug an hour before meals, in order that it may be absorbed and prevent its precipitation by the phosphates and possibly other constituents of the food. If constipation occurs under its use senna is used as a laxative, as the saline purgatives have a precipitant action on calcium salts.

Littlejohn² and Ohlmacher³ recommend calcium lactate, 15 grains, three times daily, in the treatment of *epilepsy*; while Ciccarelli⁴ employs calcium hypophosphite in doses of from 30 to 45 grains daily for the same purpose.

The calcium salts have also been recommended in the treatment of amenorrhea, osteomalacia, and rickets.

Cerium Oxalate has long been employed for the *vomiting of early pregnancy*, but with very indifferent results.

Bache and Wessler⁵ have investigated the drug, and find that:

1. Commercial cerium oxalate is non-toxic.
2. Cerium oxalate has no inhibitory effect whatever on vomiting of central origin.
3. Cerium oxalate may inhibit vomiting due to local irritation of the gastric mucosa, but only if given in large doses for some time so as to coat the stomach wall pretty generally.
4. Cerium oxalate is not absorbed from the gastro-intestinal tract.

From their study they conclude that there is a very close analogy between cerium oxalate and bismuth subnitrate. Both salts are insoluble,

¹ British Medical Journal, January 30, 1909.

² Lancet, May 15, 1909.

³ Journal of the American Medical Association, August 14, 1909.

⁴ Il Policlinico, February 7, 1909.

⁵ Archives of Internal Medicine, January 15, 1909.

and because of this property neither is absorbed from the gastro-intestinal tract. Because of this property bismuth has long been employed for various local disorders of the alimentary canal where it was desirable to furnish a protective coating. In this respect cerium oxalate has also proved efficient in relieving the irritability of the stomach in alcoholic gastritis and for the gastric disturbances that occasionally manifest themselves in the course of the acute infections. The drug may also be of service in gastric ulcer when the vomiting is due to a local irritation of the mucous membrane.

To be of service, however, the drug must be given in doses comparable to those in which bismuth subnitrate is given. The usually employed dose (1 to 5 grains) is entirely too small to be of any use.

Chloretone. Taylor¹ reports favorable results from the use of chloretone in 12 cases of *chorea*. According to Taylor, an attack of chorea of moderate severity will last from six to eight weeks if treated by rest, and arsenic is administered. The good results previously published by Wynter² led Taylor to try the drug. Wynter reported 14 cases of chorea treated with chloretone. He stated that "the choreic movements were limited to nine days, and the stay in the hospital to three weeks on an average."

Taylor's 12 cases were consecutive, and varied in age from five to fifteen years; all but one were females. The average duration of the choreic movements after beginning treatment by chloretone was eleven days. The length of their stay in the hospital was not reduced, however, for he kept the patients in for some time to see if there would be any relapse. Relapse occurred in 2 cases, but in each instance the choreic movements ceased after two and three days' treatment by chloretone.

One case was particularly severe. The child had been suffering from chorea for four months, and for six weeks prior to coming under Taylor's care had been isolated in a dark room and treated with arsenic. The choreic movements were general, and the patient was unable to stand or talk. She was put on 5 grains of chloretone three times a day; in twenty-one days the choreic movements had ceased and she was up and walking about.

Taylor administered the chloretone in doses of from 3 to 10 grains three times a day, according to the age of the patient; in 2 cases the drug was given every four hours. Each dose of the chloretone was administered in 1 drachm of petroleum emulsion.

As soon as there was the slightest improvement, generally after the seventh or eighth dose (two to three days), the dose was reduced by 1 grain each until 1 grain only was taken three times daily. After eight doses of 1 grain each had been taken, if the chorea had ceased, the patient was given extract of malt and cod-liver oil.

¹ *Folia Therapeutica*, October, 1908.

² *Lancet*, March 30, 1907.

The only untoward effects noted were drowsiness in two and a red erythematous rash in another.

Peterson and Hutchings¹ report a case of *tetanus* developing on the twelfth day after operation, successfully treated with rectal injections of chloretone. The patient received two injections of 60 grains of chloretone dissolved in hot olive oil. Hutchings had prior to this treated successfully 5 cases of tetanus, 3 being bad Fourth of July accidents from fireworks or pistol shots.

As has been pointed out in previous issues of PROGRESSIVE MEDICINE, the value of any treatment in tetanus developing after the eighth or tenth day is problematical. Cases with a long incubation period, the so-called chronic cases, have recovered under all sorts of treatment.

Cloves. Acting on a suggestion made us by Dr. H. A. Hare, Hartz and myself² employed oil of cloves (*oleum caryophylli*) in cases of *tuberculosis* having large amounts of sputum.

Cases presenting the following symptoms were selected: The patients had severe paroxysms of coughing, which finally ended in the expectoration of large quantities of thick, lumpy, greenish-yellow sputum. The amount of sputum varied in different cases between one and one-half and four sputum boxfuls in twenty-four hours. These cases, without exception, had been treated with various cough mixtures, and in some instances large doses of codeine or morphine had been employed, without giving relief.

In those instances in which the drug acted favorably the cough abated in severity and frequency and the amount of sputum was greatly reduced, in some instances from three or four boxfuls to one or one-half boxful in the twenty-four hours. In addition, the character of the sputum changed, becoming less lumpy in appearance and more like ordinary saliva. The sputum was furthermore expectorated with little or no difficulty. In a few instances there was a general improvement in the condition of the patients, which must be largely ascribed to their obtaining more sleep and retaining their food, rather than to any direct effect of the oil of cloves. One case of *bronchiectasis* with large amounts of foul-smelling sputum was greatly benefited.

The success obtained in cases having large amounts of sputum led to the employment of the drug in patients having a severe cough, but in whom the amount of sputum expectorated was not a marked feature. The results in these cases were uniformly bad. The cough became tighter and the patients complained of a feeling of constriction around the chest.

Of the 50 cases in which we employed the drug, 30 had a severe cough and expectorated large quantities of sputum, while in the remaining 20 the amount of sputum was slight and the cough, for the most part, was unproductive.

¹ British Medical Journal, April 24, 1909. ² Therapeutic Gazette, June, 1909.

Twenty-four of the 30 patients with large amounts of sputum were distinctly benefited. As has been already stated, those with an unproductive cough were not helped, and, as a rule, were made worse by the drug.

Given internally the oil of cloves may be administered in the dose of from 3 to 5 minims in half a glass of milk or in capsules. A number of combinations were tried in the attempt to obtain a pleasing pharmaceutical preparation, but we did not succeed in getting anything better than the following:

℞ —Olei caryophylli,
 Syrupi senega āā fʒij
 Ext. glycyrrhizæ fl. fʒiss
 Aquæ destillatæ q. s. ad fʒiij—M.
 Sig.—Teaspoonful three times daily after meals.

The drug may also be administered hypodermically, once daily, in the dose of 5 minims to 30 minims of pure olive oil.

The internal administration may be continued for from ten days to three weeks. If, however, no benefit results in ten days, its use would better be abandoned. Even in those cases in which oil of cloves is taken with a good effect it seems advisable to discontinue its use at the end of two or three weeks. If the expectoration again increases, the drug may be resumed.

The untoward effects noted in patients who took the drug with good results were of a trivial nature. Nearly all complained of a slight burning sensation in the mouth and esophagus after taking the drug. This, as a rule, lasted but a few minutes, and in a day or two disappeared entirely. Two patients were unable to take the drug, as it was almost immediately rejected by the stomach.

Recently I have found that an initial dose of 2½ or 3 minims is preferable to 5 minims.

Coley's Toxins. Two years ago¹ Coley published a paper on the results he had obtained with the mixed toxins of erysipelas and *Bacillus prodigiosus* in the treatment of inoperable sarcoma. At that time he had notes on 42 cases. He has published an additional paper,² the total number of cases now treated being 51. The results obtained in these cases were as follows: 35 had remained well from three and one-fourth to sixteen years, 14 from ten to sixteen years, and 28 from five to sixteen years.

The indications for using the toxins are: (1) In all cases of inoperable sarcoma, excepting the melanotic, which were probably of epithelial origin. (2) In cases of sarcoma originating in the long bones, in which operation meant the sacrifice of the limb. (3) Immediately after opera-

¹ PROGRESSIVE MEDICINE, December, 1907, p. 279.

² Medical Record, April 10, 1909.

tion (within a week or two) in all primary inoperable cases, as a prophylactic against recurrence. (4) In addition to the foregoing, after primary operations for carcinoma as a prophylactic against recurrence.

Coley believes the use of the toxins as a prophylactic after operation offers by far the most important field of all, the proportion of recurrences in his own experience thus far being less than 25 per cent., whereas in cases in which the toxins were not used after operation the proportion of recurrences had been fully 75 per cent.

In Coley's hands the toxins have been free from danger. While serious untoward effects have followed their use in the hands of others, they have been due, in Coley's opinion, to the neglect of precautions which he has emphasized in former papers.

Lilienthal, in discussing Coley's paper, referred to cases in which he had successfully used the toxins. He frequently employs the toxins as a prophylactic, and thus prevented a recurrence in cases in which it could otherwise have been confidently expected. Bainbridge, who also discussed Coley's paper, is skeptical as to their value.

Hertel¹ is so favorably impressed with the effects of the toxins that he regards it as a duty to use them in every case, especially after removal of a sarcoma, to prevent or attenuate recurrence.

In commenting on Coley's results in *PROGRESSIVE MEDICINE* for December, 1907, it was pointed out that it was highly desirable that this method of treatment should have a thorough trial. In the present volume Dr. Bloodgood has also called attention to the subject.

Cuguillere's Serum. This preparation was first introduced by Cuguillere about nine years ago for the treatment of *tuberculosis*. It is a light yellow fluid about the consistency of simple syrup, having a strong odor of garlic, and produces a burning sensation when injected into the skin. Its composition as given by Cuguillere is as follows:

R _y —Allylum sulphide	1 gram.
Tincture of myrrh	1 gram.
Haymen's glycerinated serum.	100 grams.

In reply to a communication of Muschlitz,² the *Journal of the American Medical Association* for December, 1908, gave the following information: "It appears, therefore, to be no serum at all, because the 'serum' component is merely Haymen's fluid or artificial serum, the formula of which is usually given as mercuric chloride, 0.5; sodium sulphate, 5; distilled water, 200, with an addition of glycerin. The two other components are the 'active' ones, according to Dr. Cuguillere, who has a strong belief in the 'extraordinary power of garlic and the ethereal oils containing organic sulphur.' Allylum sulphide is the principal component of the ethereal

¹ Hospitalstidende, Copenhagen, March 24, 1909; *Journal of the American Medical Association*, June 5, 1909.

² *Therapeutic Gazette*, June, 1909.

oil of *allium sativum*, and, like the latter (garlic), has had some reputation as a remedy for tuberculosis. Regions in which much garlic is consumed, such as Galicia, are reported comparatively free from tuberculosis; and R. Koch has also experimentally demonstrated that the *Bacillus tuberculosis* is little resistant against the various aromatic substances, especially the oil of garlic and the allied oil of mustard. Therefore, the formula given cannot indicate the true composition of this 'serum.' "

Caravia¹ has published a paper on the use of this serum, claiming for it a specific effect in all forms of tuberculosis.

Caravia's enthusiastic report led Muschlitz to try the "serum" in bone tuberculosis. His results were absolutely negative. As Muschlitz states, "It would appear natural to expect that a remedial agent that had been successfully employed for nine years by Cuguillere would be extensively used by others, and yet few journals or text-books reveal any such evidence."

Digitalis. For certainty of action when given under the proper conditions, this drug may be ranked as a specific. It is preëminently the drug for cardiac conditions and it is only in cases of intolerance or idiosyncrasy that we turn to other remedies.

There is considerable misapprehension as to the therapeutic indications for digitalis. If it is kept in mind that digitalis has to do with the heart muscle and cannot repair or alter a damaged valve, the indications for its use are clear. This point was specially emphasized in a paper by Janeway, which I reviewed in *PROGRESSIVE MEDICINE* for December, 1908, p. 281. Janeway pointed out that digitalis has to do with the ventricles only, and so long as the ventricles perform their work digitalis has no place in the therapy of valvular lesions.

The importance of confining our use of digitalis to cases with a weakened heart muscle is also emphasized by Blackader.² This author holds, in common with most clinicians at the present time, that digitalis is not contra-indicated in aortic regurgitation when muscular weakness occurs. While it is true that a weakened muscle is less common in cases with aortic regurgitation than in mitral lesions, the problem is identical when it does occur.

Blackader points out the importance of rest in conjunction with digitalis in individuals showing signs of failing compensation. It has always seemed to me that any case needing digitalis also needed rest, and for this reason I rarely prescribe the drug to dispensary patients. In the first place, if there is sufficient cardiac weakness to warrant the use of digitalis, rest is equally important, and in the second place, an individual taking digitalis should be under stricter supervision than is possible in an ambulant dispensary patient.

¹ Medical Record, September 26, 1908.

² Therapeutic Gazette, October, 1908.

It is generally held that in cases with high arterial tension digitalis is contra-indicated. There is, however, a type of case with high arterial tension which, as Blackader points out, is distinctly benefited by digitalis. In such cases there is, in addition to the signs of a weakened muscle and high tension, renal inadequacy and edema. Blackader believes that in these cases it is frequently necessary to maintain the high tension by means of digitalis in order to prevent venous stasis. On the other hand, I have seen the tension lowered in such cases under the diuretic effect of the digitalis and the improvement in the cardiac action.

Blackader believes the use of digitalis is allowable in those occasional instances of essential cardiac weakness in which the heart muscle appears to be congenitally weak. In such cases it may be used for a prolonged period. It may also be used for heart weakness due to malnutrition.

J. L. Miller¹ states that the daily secretion of urine and the character and frequency of the pulse should be noted in every patient who is given digitalis. The first evidence of the physiological action of the drug is an increased secretion of urine, which begins, on an average, forty-eight hours after the treatment is instituted. With the increased flow of urine the dose should be reduced. In regard to the pulse, Miller points out that moderate slowing of the pulse is desirable, but very decided slowing is harmful. Arrhythmia developing under the use of digitalis is very important, and calls for a suspension of the treatment until the cumulative effect has passed off.

Cloetta² has reported the results of some experimental work with digitalis. He states that in rabbits treated for a period of two years with subcutaneous injections of digitalis, the hearts did not become enlarged. This is contrary to the accepted idea regarding the effect of digitalis on the heart muscle. Some years ago H. A. Hare fed digitalis to pigs. At the end of several months the hearts of the experimental animals were distinctly hypertrophied as compared to the controls.

Cloetta also asserts that acute endocarditis which he produced experimentally in animals was distinctly benefited by digitalis. Blackader³ believes that both acute endocarditis and acute myocarditis absolutely contra-indicate digitalis. What is essential at this time is absolute rest and low vascular tension. If stimulation is needed during the acute stage, strychnine, ammonia, camphor, or alcohol is to be preferred.

Reilly⁴ advocates large doses of digitalis in the treatment of *pneumonia*. This method of treating pneumonia has been before the profession for some years. The late J. M. Da Costa advocated digitalis routinely in every case of pneumonia. It is a method, however, which has never gained a wide following. Reilly reports a mortality of 3.17 per cent. in

¹ Journal of the American Medical Association, November 21, 1908.

² Therapie der Gegenwart, October, 1908.

³ Loc. cit.

⁴ Journal of the American Medical Association, December 26, 1908.

a series of 126 cases of lobar pneumonia, and 16.6 per cent. in 24 cases of bronchopneumonia.

As I have pointed out in previous years in discussing so-called specifics for pneumonia, mortality rates based on a small number of cases mean nothing. The disease varies so from year to year and even from month to month in the same year that such results do not prove the efficiency of any treatment.

Of the active principles of digitalis McGee¹ prefers *digitalin*. He has found it effective in doses of from $\frac{1}{60}$ to $\frac{1}{30}$ of a grain. By some digitalone is considered the better preparation. Digitoxin (digalen) is not satisfactory because of the close approximation of the physiological and toxic dose (Fraenkel, quoted by Miller).² As a substitute for digitalis in those cases in which the drug is not well borne, Robertson³ recommends *squill*.

Ergot is considered by Bonney⁴ as the most efficient drug we possess in the treatment of *uterine hemorrhage*. He usually prescribes the drug in an acid solution combined with strychnine:

R̄—Ext. ergot. fl.	℥xxx
Liq. strychninae	℥v
Ac. hydrochlor. dil.	℥x
Aquæ	q. s. f ̄j

If the uterine hemorrhage is complicated with anemia, he combines iron in the acid mixture, as follows:

R̄—Ext. ergot. fl.	℥xxx
Tr. ferri perchlor.	℥v
Ac. hydrochlor. dil.	℥x
Aquæ	q. s. f ̄j
R̄—Ext. ergot. fl.	℥xxx
Ferri tartras	gr. x
Ac. tartaric	gr. x
Aquæ	q. s. f ̄j

Strychnine may be added to either of these mixtures.

While Bonney believes ergot the most efficient of the uterine hemostats, there are certain conditions in which it is contra-indicated. It should never be employed in the presence of uterine fibroids, for it has been shown that the continuous administration of ergot by producing an arterial contraction throws an increased strain on the cardiac muscle. Degenerative changes in the heart muscle are now well recognized as occurring in association with fibroids of long standing and frequently offer a serious obstacle in considering operative interference.

The only treatment of uterine hemorrhage depending on fibroid

¹ Cleveland Medical Journal, December, 1908.

² Loc. cit.

³ Medical Record, November 7, 1908, p. 815.

⁴ Clinical Journal, April 2, 1909.

tumors, is operative. The administration of drugs is only palliative, and tends to increase the danger of cardiac dilatation.

Bonney also condemns the use of ergot in cases of incomplete abortion with a view to the expulsion of the retained placental fragments. While occasionally successful, it more often fails and increases the danger of septic infection. The proper treatment of such cases is exploration of the uterus under an anesthetic.

The great field for ergot is in those cases where the organ is soft. When the consistency of the organ is hard and firm, not much is to be expected. There is, however, one exception to this rule, namely, in chronic fibroid metritis. In this condition the uterine muscle becomes degenerated and there is a diffuse overgrowth of fibrous tissue. Severe uterine hemorrhage sometimes occurs in these cases. If ergot fails to control the hemorrhage, the only treatment then available is hysterectomy.

In cases of subinvolution after abortion or labor the ergot should be given continuously for several weeks.

When ergot is given to lessen menstrual bleeding it should be administered two days before the period and continued as long as loss is going on, and from two to seven days afterward.

Bonney always gives the ergot in solution if possible. He has found some of the solid forms quite inert, especially if they have been kept too long. The variability of ergot preparations has also been exposed by Edmunds and Roth,¹ who, in an analysis of a number of preparations, found some of them nearly worthless. They urge the necessity of a physiological assay. At present our greatest safeguard seems to be in Bonney's recommendation, namely, the employment of preparations made by the larger drug houses.

I desire to especially direct attention to Bonney's warning against employing ergot or any other hemostatic drug in cases of genital hemorrhage, without the precaution of making a digital examination. Not a few cases of fibromyoma and cancer of the cervix have been treated in this way for months without the precaution of an internal examination. The bleeding in these cases is too frequently ascribed to the "change of life," and the patient is thus allowed to drift into a hopeless condition. I have been greatly impressed with the necessity of carefully investigating not only cases of excessive uterine bleeding, but any irregularity in the character of the menstrual flow. In studying a number of women, approaching or passing through the climacteric, in the Medical Dispensary of the Jefferson Medical Hospital, during the past winter, I was surprised, on referring them to the Gynecological Department, to learn that several had gross pathological changes in the cervix or uterus. Previous to the gynecological examination there had been nothing to suggest anything serious.

¹ Journal of the American Medical Association, December 19, 1908.

Cronyn and Henderson,¹ from experimental observations, advise the use of ergot in certain emergencies, such as *shock* and *postpartum hemorrhage*. *Ergotoxin* has the properties most desired in medicine. Given by mouth, its action is feeble; it is more efficient when administered subcutaneously, and still more so when given intravenously. Given intravenously, the effect should be watched carefully and care taken not to repeat the dose too frequently. Ergot in any form, given by mouth, is in their opinion of doubtful value.

Fresh Air. At the last annual meeting of the Pediatric Society, Chapin, Graham, and Northrup² read papers on the use of fresh air in the *diseases of childhood*. As the result of recent experience, Northrup is of the opinion that all the febrile disorders of childhood, with the possible exception of measles, are benefited by an abundance of fresh air. In submitting patients to this treatment Northrup insists that comfort, both for the patient and the nurse, is essential. In preparing the bed, attention to certain details are necessary. These were pointed out by Northrup last year and may be repeated. A layer of paper should be placed beneath the mattress; beneath the mattress is placed a blanket, which should surround the mattress completely and come up on all sides. The sides of the blanket are then brought up and fastened in the middle above the patient. Over this one or more blankets can then be placed. In this way the patient is protected perfectly from draughts beneath the bed.

Jacobi,³ in discussing the above-mentioned papers, called attention to the great value of fresh air not only in preventing *rickets*, but in relieving the condition when present.

Although, as Patek⁴ states, the open-air treatment of *pneumonia* is too recent to permit of showing results from extensive statistics, those so far obtained are significant. It is furthermore remarkable that the benefits of this method have been recognized throughout the world and are everywhere being made use of. Thus, Patek quotes favorable results obtained by White in India and Rennie in Sydney, N. S. W. In view of the fact that there are still many physicians who have failed to appreciate the value of free ventilation in the treatment of pneumonia, it is interesting to note that Stephen Harnsberger, of Virginia, has employed this method for twenty-nine years. He believes that the greater fatality of pneumonia today over what it was one hundred years ago is due to lack of fresh air. Formerly, houses were not so well constructed and ventilation was more or less constant; while today houses are almost hermetically sealed and the air vitiated by modern methods of heating and lighting.

Patek states that time and again has he witnessed the intense suffering of patients, as indicated by increased dyspnea and cyanosis, when for

¹ Journal of Pharmacology and Experimental Therapeutics, August, 1909.

² Archives of Pediatrics, January and February, 1909.

³ Ibid.

⁴ Wisconsin Medical Journal, June, 1909.

some reason or other they were taken from the cool fresh atmosphere into warm rooms.

Within the past few days I saw a woman in consultation who was being treated under almost the identical conditions set forth by Northrup as necessary to kill the pneumonia patient. She was in a small room containing one window, a gas jet was fully lighted, and a blast of hot air was pouring from the register. Besides, two or three people were constantly in the room. An oxygen tank completed the picture.

In previous issues of PROGRESSIVE MEDICINE I have tried to deal in a conservative manner with the limitations of climate as a factor in the treatment of *tuberculosis*. While climate was at one time looked upon as the sole consideration in dealing with tuberculosis, there has occurred in the past few years a decided change of opinion. This change of opinion was brought about primarily by the necessity of treating patients in their homes without any of the so-called climatic advantages. The results obtained with these patients demonstrated that even under unfavorable conditions, from a climatic view-point, success was possible. It is not surprising, therefore, that the conclusion was reached by some that a climatic change was unnecessary in all cases.

In considering, in a given case, whether the advantage of a change of climate shall be tried, certain facts must be borne in mind. In the first place, the financial ability of the individual must be considered; for it is obviously useless to advise a change of climate if such a change is beyond the means of the patient. It may be accepted, as a general rule, that no patient should seek relief at a climatic resort if he is not able to obtain all the comforts necessary to his condition.

A second consideration, and in many respects the most important one, is the sending of hopelessly diseased patients to resorts far from their homes, even when they can afford the expense. Patients in an advanced stage of the disease are only too eager to avail themselves of anything that offers even a faint hope of relief. I have called attention before to the cruelty of sending these people away. Watkins,¹ of Phoenix, Arizona, in an article entitled "Ignorance or Malpractice?" considers this aspect of the question. He points out that many patients are annually sent to the Southwest who arrive there utterly destitute and at once become a charge on these communities. In some instances they are sent with the advice to "live outdoors, stay away from doctors, and you will get well."

Not a few of these "patients are those who have reached an advanced stage of phthisis, and in whom the disease is making steady progress, insidious or rapid, as the case may be, whose financial means are small, and who cannot, under the most favorable surroundings, provide themselves with more than the necessities of life, or who, perhaps, are the actual wards of charity."

¹ Journal of the American Medical Association, April 10, 1909.

While the sending away of all of these patients cannot be blamed on physicians, there is no doubt that entirely too many are induced to try the "only hope" at some health resort. Aside from the financial ability of the individual to make such a change, the extent of the disease and our therapeutic limitations ought to be sufficient warning that nothing can be done.

A recent editorial article¹ has also taken up the question of sending to the West and Southwest patients who are in the terminal stages of tuberculosis, or even curable patients who are without adequate means. According to this article, the National Association for the Study and Prevention of Tuberculosis has reached the conclusion that over 7000 persons hopelessly ill with consumption go or are sent annually to the West and Southwest, and that at least 50 per cent. who go are so far advanced in their disease that they cannot hope for a cure in any climate, under any circumstances.

Furthermore, the financial condition of these incurables is such that 60 per cent. of them have not sufficient means to provide for the proper necessities of life. This means that over 4000 consumptives either have death hastened by lack of good food and medical attention, or else that they are forced to accept charitable relief.

It is not surprising that these communities have protested, and, as the article just quoted from states, their protests have been exceedingly moderate under the circumstances.

I cannot believe that physicians wilfully send patients away under these circumstances, but my experience at the White Haven Sanatorium has led me to believe that in the minds of many there is a very inadequate idea of the limitations of treatment in the advanced stages of the disease.

Knight² expresses it very well when he states: "If there was to be a choice between sanatorium treatment near home and a life without medical restraint under radically changed climatic condition, the choice would be for the former." This is true also in the "home treatment," providing the patient can be controlled.

Because of the efficient hygiene and the control one has of the patient, the sanatorium is invaluable in treating the disease. The educational features of a sanatorium are so valuable that it is desirable whenever possible, to send a patient to such a place even if he can afford to stay but a short time. He then learns by actual experience what is often very difficult to impress on him in his home surroundings.

This same idea is emphasized by Stone,³ who states that while almost every incipient case can be benefited by a stay at a sanatorium, they must eventually return home, so that home treatment becomes a factor in nearly every case.

¹ Journal of the American Medical Association, September 18, 1909.

² Medical Record, October 10, 1908, p. 637.

³ Boston Medical and Surgical Journal, September 28, 1908.

Success in treating tuberculosis at home, whether from the beginning or after the individual's return from a sanatorium, depends on attention to detail. As Stone states, the physician must not content himself with giving general directions, but must be willing to go into bothersome details.

Those who work among the tuberculous working men and women in cities have long realized that even if the working place is not altogether satisfactory from the fresh-air standpoint, much can be done if the individual obtains as much fresh air and rest at night as possible. In many instances the lack of facilities and the inability to impress on people the necessity of sleeping in a well-ventilated room renders the obtaining of the proper amount of fresh air impossible.

To obviate these difficulties and at the same time have some control of these patients, White,¹ of Pittsburg, has established a night camp. The patients report at the end of the day's work; their temperature and pulse are taken and recorded when they retire to their reclining chairs or bed to rest until supper. After supper they are at rest until bedtime, 9 P.M., when they sleep outdoors. The time of their return to the hospital varies in compliance with the requirements of their work. The work is arranged with the employer to suit the case as nearly as possible. In the morning they rise, dress, have their temperature and pulse recorded, take their breakfast, and go to work. Lunch is taken out of the hospital.

The advantages to the patient are evident: constant medical supervision and advice, two nourishing meals daily, compulsory rest, and open-air sleeping facilities.

Carling,² who has previously³ written on the advantages of inland resorts in the treatment of *bone tuberculosis*, reiterates his belief that equally good results can be obtained as at the seashore. He calls attention to the fact that the large city hospitals are doing very little for this class of cases. In his opinion, these hospitals should have a country branch, to which cases requiring open-air treatment could be moved.

The advantage of sunlight as a climatic asset has received so much attention both for and against, but principally for, that the following observations by Grawitz⁴ are of interest. Grawitz has seen nervous disturbances develop in a number of persons after prolonged exposure to the sunlight. When the exposure has been carried to extremes, the heart action is accelerated, systolic murmurs develop, the area of cardiac dullness increases to the right, pulse tension is increased, the second aortic sound is accentuated, and occasionally symptoms of collapse occur. Headache and depression sometimes persist for days and the nervous

¹ Journal of the American Medical Association, January 30, 1909.

² Boston Medical and Surgical Journal, August 27, 1908.

³ PROGRESSIVE MEDICINE, December, 1907, p. 301.

⁴ Deutsche med. Wochenschrift, August 19, 1909.

system becomes much excited. The temperature was also increased. He ascribes these symptoms to exposure of the unprotected head.

In exposing tuberculous patients to sunlight it is always advisable to have the head in the shade and not directly exposed.

Hydrogen Peroxide. Petri¹ has called attention to the fact that hydrogen peroxide has a very marked influence on the hydrochloric acid of the stomach. By its use the hydrochloric acid can be reduced to zero. When used to reduce the acidity within normal bounds, Petri advises giving the peroxide like a mineral water in the morning on an empty stomach, 1 to 3 parts in from 200 to 300 c.c. of water. It can also be used in a 0.25 to 0.5 solution for washing out the stomach in cases of hyperacidity and acid fermentations. Owing to its ability to reduce the acidity of the stomach Petri believes the peroxide will be found serviceable in cases of hyperacidity, hyperchlorhydria, ulcer and spasm of the pylorus.

Goodman² has recently reported favorable results with hydrogen peroxide in these conditions in a paper read before the 1909 Meeting of the Pennsylvania State Medical Society.

Hydrotherapy. Hanson³ and Gordon⁴ advocate tepid baths in the treatment of *scarlet fever*. Hanson reports 141 cases, with 25 deaths (16 per cent.), treated in this way. He used water at a temperature of 90° F., each bath lasting from five to ten minutes. Gentle friction was used while the child was in the bath. The baths were repeated sufficiently often to control the temperature and symptoms. In severe cases the bath is given every two or four hours for three or four days. Gordon states that in the average case the bath should be given two or three times a day until the temperature has become normal and stationary and then once a day until the child is pronounced free from infection.

Iodine. The use of iodine as an antiseptic in surgical work has been referred to in previous numbers of *PROGRESSIVE MEDICINE*. Dannreuther⁵ has contributed a second article on the subject. He gives the technique employed by Goelet and himself during the past year. The authors employ a solution of iodine for sterilizing both the hands and the field of operation. The hands and arms are scrubbed with liquid soap for five minutes and then immersed in an iodine solution for two or three minutes. The operative field, having been previously prepared in the ordinary manner, is cleansed with soap and a gauze sponge, a little ether and alcohol dropped on it, and the umbilicus filled with tincture of iodine. In emergency operations tincture of iodine in full strength is applied over the operative field, allowed to remain about thirty seconds, and wiped out.

¹ Archiv f. Verdauungskrankheiten, October, 1908.

² New York Medical Journal, November 6, 1909.

³ Journal of the American Medical Association, October 17, 1908.

⁴ Practitioner, January, 1909.

⁵ Medical Record, January 16, 1909.

Porter¹ also speaks well of iodine for purposes of sterilization. He paints over the operative field a 10 per cent. spirituous solution of iodine.

Dannreuther uses sponges soaked in a solution of iodine to mop out the abdominal cavity if pus is present. For irrigating purposes he employs a solution consisting of a dram of tincture of iodine to a pint of water. This is poured directly into the wound.

Tatchell² has found the local application of iodine liniment (B. P.) very efficient in the treatment of surgical tuberculosis. He applies the iodine daily by means of a swab made by wrapping a piece of cotton around the end of a probe. At the first dressing Tatchell inserts a thin piece of gauze or packs lightly. At subsequent dressing this is omitted, as he believes such treatment tends to cause the sinuses to become chronic.

Dannreuther believes that the irrigation of wounds by a solution of iodine promotes union of the incision, and is the best method of procuring sterilization of the abdominal wound. In this connection it is interesting to note that Schanz³ prevents the occurrence of an unsightly scar by painting the wound the third or fourth day after operation with tincture of iodine. For a small wound, in well-nourished parts, one application is sufficient, but for larger wounds the application should be made every day from two to five days. The edges of the wound under the influence of iodine stick so close together that they heal without spreading. The resulting scar leaves but little more trace than a needle scratch. The diminution in the size of the scar is probably due to the hyperemia induced by the slight irritation.

Dannreuther⁴ also employs iodine catgut ligatures. They are prepared as follows: The raw strands of appropriate sizes are immersed in a watery solution of 1 per cent. iodine and 1 per cent. potassium iodide crystals, allowed to remain for eight days, and then transferred to a dry sterile jar covered with gauze. In regard to this method, Dannreuther states that catgut so prepared is antiseptic as well as aseptic (proved by bacteriological experiments), it absolutely cannot be infected, its tensile strength and pliability are increased, and it is exceedingly cheap.

Guibé⁵ and Gley⁶ employed tincture of iodine as an antiseptic in experimental surgery. Gley used the following:

Tincture of iodine	15 parts
Alcohol (95 per cent.)	75 parts

The iodine in alcohol rapidly infiltrates the intercellular spaces and lymphatic vessels of the skin, thus destroying any germs they may contain. The rapidity with which the sterilization is effected is a decided advantage. This, as pointed out by Dannreuther,⁷ makes iodine especially valuable in emergency operations.

¹ British Medical Journal, February 6, 1909.

³ Zentralblatt f. Chirurgie, August 8, 1908.

⁵ La Presse Médicale, May 26, 1909.

⁷ Loc. cit.

² Ibid., February 13, 1909.

⁴ Loc. cit.

⁶ Ibid., July 17, 1909.

Moloney¹ has found iodine ointment very efficient for relieving the pain and irritation of insect bites (mosquitoes, bees, wasps). The ointment is made by adding 30 or 40 grains of iodine crystals to an ounce of saponated petrolatum.

Iodipin is one of the newer compounds introduced as a substitute for the iodides. It is an additive compound of iodine and sesame oil. It is administered in doses of 30 to 45 minims of the 25 per cent. preparation, which is equivalent to 10 grains of iodide of potassium. The dose hypodermically is 15 minims of a 10 per cent. preparation.

Freshwater² states that it can be used to advantage in cases having an idiosyncrasy to potassium iodide. It is painless when administered hypodermically, and as it is slowly absorbed, patients can be kept under the influence of iodine much longer than when iodine is given in other forms.

Owing to its slow absorption the drug should not be used in syphilis when a rapid therapeutic effect is desired, such as threatened perforation of the palate, cerebral gumma, etc. After the iodides have been vigorously administered in these conditions iodopin can then be resorted to. After a course of iodopin injections have been given the patient may be left without medicine for some time, during which period the iodine is being slowly absorbed.

Ipecacuanha in large doses has been recognized for some years as one of the best remedies available for *acute amebic dysentery*. Dock³ has recently reported favorable results from its use in this condition. He administers the drug in doses of from 30 to 60 grains, and then gives 20 to 40 grains for three days. The ipecac is given in pills covered with salol or keratin. The object of the coating is to prevent an emetic action, salol and keratin being undissolved in the stomach, and this makes unnecessary the use of opium preparations, formerly thought to be essential in the ipecac treatment. Dock does not approve of the use of opium in the treatment of dysentery unless the pain is very great.

Given as described, vomiting rarely occurs. As a precaution, he advises patients to lie down on the right side after taking the ipecac, and to apply an ice bag to the epigastrium or throat in case nausea appears. Patients must be warned not to chew the pills, otherwise an emetic action may be produced. In a few cases he noted excessive salivation after taking the drug. Griping after ipecac is relieved by a hypodermic injection of atropine.

In the after-treatment, hot saline or ice-water flushes of the colon are valuable. Ulcers of the rectum should be looked for, and if present treated locally.

Rogers⁴ also points out the value of ipecac in the treatment of dysentery

¹ Journal of the American Medical Association, January 9, 1909.

² British Medical Journal, May 22, 1909.

³ New York Medical Journal, July 10, 1909.

⁴ Therapeutic Gazette, June, 1909.

due to the ameba coli. Rogers states that in the vast majority of cases, the lack of success with ipecac has been because the dysentery was of the bacillary type.

Rogers' present communication is for the purpose of showing the value of ipecac in preventing the occurrence of *hepatic abscesses*. His investigations have shown that prior to the formation of the abscess there are definite signs and symptoms of an acute hepatitis. Such cases have a leukocytosis, painful and enlarged liver, the x-rays show the diaphragm higher than normal on the right side, and fever is present. A definite history of amebic dysentery may or may not be obtainable. In such cases the use of ipecac will prevent the formation of an abscess. Furthermore, its use will prevent the recurrence of abscess formation in cases that have been operated on for a definite abscess.

Rogers administers the drug as follows: From 20 to 30 grains are given once a day and continued for from one to two weeks after the temperature has subsided; in the more acute cases the drug is continued in smaller doses for some time longer. In some cases as much as 60 grains daily may be needed, but, as a rule, half this amount is sufficient, while in feeble patients and in women 20 grains will usually suffice. In one case only 5-grain doses were given by mistake, and a very acute hepatitis subsided completely, although a much longer time elapsed than is usual under fuller doses.

Rogers states that even a better method than that of using pills coated with salol or keratin is to put the powdered drug in 5-grain doses in keratinized capsules which do not dissolve in the stomach, but carry the drug into the bowel, where it is required. He has been using this method for some time in Calcutta.

Iron. It is too often forgotten that iron is not well borne when gastric disturbances are present. If there be anorexia, a heavily coated tongue, and constipation, it is advisable to correct these conditions by means of laxatives and stomachics before prescribing the iron. Eustace Smith¹ states that any sign of irritability of the stomach is to be taken as an indication that the stronger preparations of iron are to be avoided, and even the milder salts—the tartrate and the ammoniocitrate—should be prescribed timidly, and in conjunction with an alkali, such as citrate of potash or the aromatic spirits of ammonia, in a freshly made bitter infusion.

In Smith's opinion failure to obtain results in some cases of chlorosis is due to neglect of the gastric condition. In some of these cases the stomach contains tenacious mucus. Under these circumstances he administers 20-grain doses of zinc sulphate, taken fasting on successive mornings. The stomach may also be cleaned out by irrigations of warm normal salt solution. In some instances this is all that is necessary to reestablish health.

¹ British Medical Journal, October 17, 1908.

Smith advises the ferrous chloride or sulphate in rickets and splenic anemia; for tuberculosis of the bones and glands in children he prefers the tincture of the chloride of iron in doses of from 5 to 10 drops, together with small doses of bichloride of mercury. In the treatment of nephritis he prefers Basham's mixture.

For conditions associated with a depraved condition of the mucous membranes (children convalescent from chronic diarrhea, chronic bronchitis, menorrhagia, leucorrhea), he advises small doses of the permittate of iron (B. P.). This preparation is a reddish-brown solution containing ferric nitrate. It is used under the same conditions as the chloride (U. S. P.) or the perchloride (B. P.) of iron.

Colman¹ believes that iron is a necessary drug for children convalescing from *acute rheumatism*. He recommends the ammoniocitrate of iron (ferri et ammonii citras, U. S. and B. P.). The drug may be given alone or with the salicylate. Colman has found that both the iron and the salicylates are readily taken by children in ordinary aerated lemonade.

Peters² has treated 42 cases of *secondary anemia* accompanying tuberculosis, with hypodermic injections of iron. As a rule, 20 injections were sufficient. He used the following formulas:

(1)	Iron citrate	gr. $\frac{3}{4}$
(2)	Iron citrate	gr. $\frac{3}{4}$
	Strychnine sulphate	gr. $\frac{1}{30}$
(3)	Iron citrate	gr. $\frac{3}{4}$
	Sodium arsenate	gr. $\frac{1}{30}$
(4)	Iron citrate	gr. $\frac{3}{4}$
	Sodium arsenate	gr. $\frac{1}{12}$
	Strychnine sulphate	gr. $\frac{1}{100}$

Morse³ has used the citrate of iron hypodermically in the *anemia of infancy*. He points out that iron is especially indicated in the anemias of infancy because of the small reserve of iron at birth, and also because milk, which makes up a large part of the diet in early life, contains a relatively small amount of iron.

In the severe forms of anemia in children, Morse prefers the hypodermic use of iron. This is advisable because of the difficulty in getting children to take sufficient quantities by mouth and also because of the danger of disordering the stomach.

Morse uses an aqueous solution of the citrate of iron. This is put up in pearls and sterilized, each pearl containing a single dose. The solution remains sterile indefinitely. Morse states that the aqueous solution is absolutely non-irritating and is never followed by induration or abscess

¹ Edinburgh Medical Journal, January, 1909.

² Medical Record, October 10, 1908.

³ Journal of the American Medical Association, July 10, 1909.

if the injection is carefully given. It is advisable to use a glass syringe with asbestos packing, which can be sterilized when necessary. The needle must be of platinum, as the solution corrodes the ordinary steel needle.

The average dose is $\frac{3}{4}$ grain every other day.

Morse has obtained very satisfactory results from this method. The effects are more marked and are obtained more rapidly than when the iron is administered by mouth, and, in addition, there is less danger of disturbing the digestion. He believes the treatment is especially indicated in the severe forms of secondary anemia with disturbance of digestion, and in those of the chlorotic type.

Rossiter¹ has employed the tincture of chloride of iron in the treatment of *elephantiasis*. Administered three times a day, he found the drug was efficacious in diminishing the size of the affected parts, and, in addition, reduced the frequency of the attacks of elephantoid fever. Rossiter advocates the use of iron as a preventive in those districts in which elephantiasis is endemic.

This treatment was originally introduced by Du Broglio, an officer in the French colonial service. Du Broglio employed rest in bed and bandaging of the affected parts, in addition to the iron. Rossiter omitted the bandaging and allowed his patients to be up and about.

Lactic Acid. The use of lactic acid bacilli in the treatment of various diseased conditions, especially those occurring in the intestinal tract, has been largely brought about by Metchnikoff. It will be recalled that Metchnikoff has advanced the theory that man's life is shortened because of the putrefactive changes which take place in the large gut. He furthermore believes that if we can prevent this putrefaction by the introduction of some agent inimical to the putrefactive organisms, life will be much prolonged. He has recently set forth his views in a book entitled *The Prolongation of Life*.

At the present time the therapeutic use of lactic acid bacilli is in the experimental stage. There can be no doubt, however, that the *Bacillus acidilactici* has been on trial long enough and the results so far obtained have been sufficiently good to justify its use.

The treatment of diseased conditions by means of lactic acid bacilli was first limited to those relating to the alimentary tract. North,² who has devoted much time to the subject, has suggested that the bacilli be applied to other body cavities subject to irritating bacteria. With this object in view, he interested a number of specialists, who have furnished him with the results of their clinical experiments. In order to show the diseased conditions so treated and the results obtained I have appended the following table from his article:

¹ United States Naval Medical Bulletin, July, 1909.

² Medical Record, March 27, 1909.

Disease.	Cases.	Cured.	Improved.	No result.
Atrophic rhinitis	56	..	50	6
Ethmoiditis	34	5	24	5
Frontal sinusitis	21	11	6	4
Acute rhinitis	51	14	..	37
Hay fever	11	..	10	1
Otitis media	14	..	10	4
Chronic rhinitis	5	..	5	..
Tuberculous sinuses	10	..	..	10
Antrum	8	..	4	4
Gonorrhea	28	2	26	..
Suppurating wounds	10	..	5	5
Peritonitis	2	2	..	..
Cystitis	2	..	2	..
Leucorrhea	7	..	4	3
Diarrhea	11	2	4	5
Rigg's disease	5	..	5	..
Gonorrheal ophthalmia	19	17	..	2
Conjunctivitis	10	10	..	..
Total	304	63	155	86

The bacilli are introduced into cavities and sinuses in the form of a broth culture by means of a syringe or spray apparatus. The parts should be first cleansed with warm saline solution to remove any heavy mucus, pus, or other matter which will interfere with the culture reaching the inflamed surface and attacking the infecting bacteria.

In the nostrils, from 1 to 5 c.c. of the culture may be injected. As a gargle much more can be used. North states that as large quantities can be taken by mouth without ill effects there is apparently no danger in large doses.

Heinemann¹ has carried out a series of experiments with the various commercial lactic acid bacilli preparations now on the market. While he is not convinced that the value of the *Bacillus acidi lactici* in cases of intestinal disorder is established, Heinemann admits that much evidence in its favor has accumulated, and that the subject should continue to be investigated. He states that so far there is no convincing evidence that sour milk prepared with commercial cultures is preferable to naturally sour milk, so far as the therapeutic effect is concerned. It seems advisable, however, to boil or pasteurize milk if good, reliable "certified" milk is not obtainable, and if this is done, an artificial starter is necessary. For this purpose any one of the commercial preparations may be used.

These commercial preparations can now be obtained in the general market. They are accompanied with full directions as to the method of preparing the milk.

¹ Journal of the American Medical Association, January 30, 1909.

Gaillard¹ has treated 10 cases of *chronic constipation* with lactic acid bacilli. The results were, on the whole, favorable.

In the London letter to the *Medical Record* (October 12, 1908) mention is made of a case of *pernicious anemia* that was greatly benefited by cultures of lactic acid bacilli.

One of the theories regarding *epilepsy* is that it is dependent on absorption of toxins from the intestinal tract. This seems to be indicated in some instances by an excess of indican in the urine. Furthermore, overloading the stomach, intestinal indigestion or constipation, sometimes provokes an attack, and in some cases seem to be the starting point of the trouble. Acting on this theory and with the idea of changing the bacterial flora of the intestines, D. J. McCarthy reported at the Journal Club of Philadelphia that he had combined lactic acid bacilli tablets with bromides. He found that the bromides in ordinary doses, when combined with the tablets, produced marked somnolence and had to be reduced one-half. The number of attacks were distinctly decreased. A meat-free diet was also employed.

Lecithin is a yellowish wax-like substance, and is one of the constituents of the brain and yolk of egg. It has been before the profession for some time as an efficient tissue builder in conditions associated with marked disturbance of nutrition (neurasthenia, general paralysis of the insane, tabes, diabetes, tuberculosis). It has also been highly recommended in anemic conditions. Klemperer² has given lecithin a trial in pernicious anemia. His results did not justify a continuance of the drug.

W. Koch³ questions the value of lecithin in conditions characterized by great exhaustion. In an analysis of normal brains and those from cases of dementia præcox and general paralysis he found no difference in the lecithin content of the normal brain and that from dementia præcox, and a very trifling diminution in that from general paralysis. He quotes Hart to the effect that "even in extreme phosphorus starvation the tissues will keep their supply of phosphorus constant at the expense of the bones."

His conclusions are that: (1) There is no evidence of any need to supply phosphorus to the brain in conditions of exhaustion, as a lack of that element has not yet been demonstrated. The actual amount lost in the exhaustion of general paralysis cannot, of course, be replaced on account of the inability of the central nervous system to regenerate.

2. The phosphorus required for the growth of the brain is amply supplied by the phosphorus of our daily diet. If desired, the addition of phosphorus-rich foods, such as eggs, sweet-breads, (pancreas), liver, and some meats, can be made to meet further requirements and will far exceed

¹ Journal de Médecine de Paris, August 8, 1908.

² Berliner klin. Wochenschrift, No. 52, 1908.

³ Journal of the American Medical Association, May 1, 1909.

in amount the phosphorus obtained in less natural form from the prescribed doses of any of the various drugs in commercial use. The use of such foods is, however, limited by their richness and their tendency, on account of their rich fat content, to interfere with gastric digestion.

3. As far as the nervous system is concerned, the addition to the diet of commercial phosphorus compounds, such as hypophosphites, glycerophosphates, phytin, lecithin, etc., is to be discouraged because, in the first place, there is no conclusive evidence that they have any effect on the growth of the brain, and secondly, the amount usually recommended means only a very insignificant addition to the amount of phosphorus (even in its special forms, such as lecithin) taken with the daily food.

Berkley¹ has employed an alcoholic solution of lecithin in the treatment of *exophthalmic goitre*. In order to test the effect of the lecithin Berkley substituted, for a time, other drugs without making any other change in the treatment. He found that without the lecithin the patients lost in weight and become nervous.

He cautions against using the drug when gastric disturbances are present. In some instances annoying erythematous rashes occur.

In his experience lecithin is an entire failure without the assistance and support of a milk diet. He can recall no instance of success in either asthenia or Graves' disease when milk was not tolerated. In addition to the milk he gives wheat foods; eggs, raw and cooked; green vegetables and fruits. Meats, sweets, and foods known to disagree with the patient are forbidden.

At first the patient is compelled to rest from 9 P.M. to 9 A.M.; the day is spent outdoors at rest. Gradually, as the patient improves, he is encouraged to take up the lighter portion of his duties.

Although Berkley claims that the patients failed to do as well when the lecithin was withdrawn, it would seem that the nutritious diet, regulation of exercise, and careful attention to detail were largely responsible for his good results.

Magnesium Sulphate. In PROGRESSIVE MEDICINE for December, 1907 and 1908, I referred to the articles by Tucker recommending a saturated solution of sulphate of magnesium as a local application in acute inflammatory conditions. Harrison² attests to the value of magnesium sulphate as an external application. He has used it successfully in orchitis, erysipelas, ivy poisoning, superficial burns, and acute articular rheumatism.

I have used sulphate of magnesium in a saturated solution in the treatment of sprained ankles. Pain has been relieved in a few hours, and the patient has been able to walk in thirty-six to forty-eight hours.

Torbett³ has found a solution of from 1 to 4 drams of the magnesium

¹ Johns Hopkins Hospital Bulletin, September, 1908.

² Virginia Medical Semi-monthly, 1909.

³ Therapeutic Gazette, June, 1909.

sulphate to a pint of water very efficient in congested and acutely inflamed conditions of the mucous membranes, especially of the pelvis. He uses it for this purpose in the form of a hot douche.

Intraspinal injections of an aqueous solution of magnesium sulphate is a recognized method in the treatment of *tetanus*. At the present time this method is most valuable in the treatment of the so-called acute tetanus, that is, the form which develops within eight days of an injury. Acute tetanus has a very high mortality, and most methods of treatment are unavailing.

Miller¹ reports a case successfully treated by intraspinal injections of magnesium sulphate. He reports 14 others which he has collected from the literature. Of these 14 cases, 11 were treated by subarachnoid injections, with 5 recoveries. Miller considers this an excellent showing, as almost all of these cases were of the type that usually proves fatal. The remaining three were treated with subcutaneous injections. I referred to the treatment of tetanus by subcutaneous injections of sulphate of magnesium in *PROGRESSIVE MEDICINE* for last year (December, 1908, p. 318). For intraspinal use 1 c.c. of a 25 per cent. solution of magnesium sulphate is injected for each twenty-five pounds of body weight of the patient.

For subcutaneous use the solution consists of 2 drams of magnesium sulphate to 4 ounces of water.

Fraser² reports a unique case of poisoning from a dose of sulphate of magnesium. The patient, a child, aged three and one-half years, took a heaping teaspoonful of Epsom salt, mistaking it for sugar. In a few minutes he was found retching and complaining of griping pains in the abdomen. Thirst was intense, and scarcely any urine was passed in twenty-four hours. The bowels did not move. The symptoms at first suggested poisoning from some irritant, but later suggested acute peritonitis. An operation was performed, and on opening the abdomen about a quart of blood-stained serum escaped. The boy recovered.

Fraser was able to collect six similar cases from the literature from 1841 to 1896.

Mercury. There has been not a little discussion during the past few years as to the best method of administering mercury in the treatment of *syphilis*. In spite of the fact that numerous articles have appeared advocating the intramuscular injections of the drug, the vast majority of practitioners still adhere to administration by mouth. Rothschild³ states that there is no doubt but that the internal administration of the drug is more often employed than any other. That it is an effective method is, he thinks, proved by the circumstance that it is so widely and almost universally employed.

Christian⁴ expresses the opinion that in 50 per cent. of the cases of

¹ *American Journal of the Medical Sciences*, December, 1908.

² *Lancet*, April 24, 1909.

³ *Folio Therapeutica*, January, 1909.

⁴ *Journal of the American Medical Association*, March 6, 1909, p. 798.

syphilis, benign in character, the internal administration of the drug for a year and a half is all that is required, although it is preferable, whenever it can be done, to institute the treatment in every case with a course of from 20 to 30 inunctions of blue ointment.

On the other hand, the advocates of the injection or inunction method give many convincing reasons why these methods should be employed. Hay,¹ of Hot Springs, Arkansas, does not believe that dependence should be placed on any one method, but that we should combine them. The following table shows the method he employs:

TABLE OF COURSE OF TREATMENT FOR FIVE YEARS.

First year.

- 2 months' inunctions or injections.
- 1 month's rest.
- 2 months' internal treatment.
- 1 month's rest.
- 2 months' inunctions or injections.
- 1 month's rest.
- 2 months' internal treatment.
- 1 month's rest.
- Giving 8 months' treatment and 4 months' rest.

Second year.

- 6 weeks' inunctions or injections.
- 8 weeks' rest.
- 8 weeks' internal treatment.
- 4 weeks' rest.
- 6 weeks' inunctions or injections.
- 8 weeks' rest.
- 8 weeks' internal treatment.
- 4 weeks' rest.
- Giving total, second year, 7 months' treatment, 5 months' rest.

Third year.

- 1 month's inunctions or injections.
- 1 month's rest.
- 1 month's internal treatment.
- 1 month's rest, continuing so throughout the entire year, alternating from internal treatment to injections or rubs.
- Thus giving the total during the third year of 6 months' treatment and 6 months' rest.

Fourth year.

- 6 weeks' inunctions or injections.

Fifth year.

- 4 to 6 weeks' inunctions or injections.

Then for the next five years the patient is given a month's treatment, thus carrying the patient up to or through the parasyphilitic stage.

¹ Journal of the American Medical Association, August 28, 1909.

For internal administration Hay uses the following pill:

R—Metallic mercury	gr. $\frac{1}{2}$
Hydrated wool fat	gr. $\frac{1}{2}$
Purified ox-gall	gr. $\frac{1}{2}$

The method of giving the inunctions is described by Hay as follows:

“After a warm bath the patient sits astride of a chair, and the attendant spreads the ointment on the back, using a rubber mitt to protect his hand. The ointment is thus rubbed in with a long, sweeping, circular motion, the attendant exercising a firm pressure, but not sufficient to produce too much warmth, as hard rubbing produces irritation. After he has finished, a thin gauze athletic shirt is pulled down over the surface to protect the other undergarments, or else a mercurial pad is used, which is impervious, and is much preferred by many patients. This pad was recently invented by Dr. Randolph Brunson, of Hot Springs, for the purpose of obtaining quicker constitutional results, as the outer covering of the pad is made of an impervious fabric, which produces a slight moisture and softening of the skin, and thereby promotes a more rapid absorption of the ointment. If the pad is used, it is worn constantly throughout the entire course. If the mercury shirt is used, it is changed every ten days or two weeks, as the patient keeps it on constantly, not removing it even when he retires. He gets constant absorption from contact, as considerable mercury becomes deposited on the shirt. Before the inunction is applied the attendant washes the back thoroughly with some good antiseptic solution. The one I prefer is the 1 to 2000 biniodide of mercury, or equal parts of liquor antisepticus, U. S. P., and saturated solution of boric acid. This latter formula is very soothing, as there is always plenty of infection on the surface of the skin, and sterilization of the back will add largely to the prevention of any irritation; any hairy portion of the back should be shaved before a course of rubs is instituted. If the patient seems to have a specially irritable skin, in addition, I have the back oiled with a solution of ichthyol and oil of sweet almond. This does not interfere with the action of the mercury, and generally keeps the back in excellent condition.”

From a very extensive experience with both inunctions and intramuscular injections, Hay is of the opinion that the former are quite as powerful as the injections. Occasionally there is encountered a case in which no absorption takes place through the skin. In such cases the injections can be used.

For injection purposes Hay has used for the past three years a formula recommended by Heidingsfeld, which consists of pure hydrated wool fat and bidistilled dental mercury, equal parts by weight. This makes a 50 per cent. ointment, of which 1 minim approximately represents $\frac{1}{2}$ grain of metallic mercury. The dose is from 2 to 3 minims. Some have administered as much as 5 minims. Hay, however, prefers 1 minim, and gives the injections more frequently.

Hay states that the six cardinal points in the treatment of syphilis are to keep a close observation on the weight, kidneys, bowels, stomach, gums, and nervous system, especially the latter, as some patients will never manifest any evidence of mercury in the form of stomatitis, and the first evidence you have is a profound and acute nervous prostration.

Klotz¹ believes that the most efficient treatment of the late manifestations of syphilis is by mercury alone as offered by the intramuscular injections of insoluble mercurial preparations, of which calomel is the most reliable one.

For a complete description of the details of giving intramuscular injections, the reader is referred to Gottheils' article in *PROGRESSIVE MEDICINE* for September, 1906, p. 143.

While not agreeing with Metchnikoff that calomel ointment will infallibly prevent the occurrence of syphilis, Neisser² believes that it is an extremely valuable prophylactic. He believes that energetic washing with a bichloride of mercury solution, 2 or 3 to 1000, is equally efficient. The following formula is also recommended:

R _x —Hydrarg. bichlor. corros.	0.25
Natr. chlorati	0.5
Aquæ destillatæ	2.0
Alcohol absolut.	0.5
Glycerini	100.0

Or, instead of glycerini, 100.00:

R _x —Ung. paraffini	80.0
Glycerini	20.0

Neisser states that syphilitic infection can be best avoided by lubrication of the penis before cohabitation, combined with disinfection afterward.

Last year I reviewed the work of Wright on the treatment of *pulmonary tuberculosis* by means of hypodermic injections of the succinimide of mercury. During the last year, Wright³ has published another paper on the subject. Additional papers have been published by Hayden,⁴ reporting 4 cases, and Squire and Kilpatrick,⁵ reporting 13 cases. The last-named observers state that for the first four or five weeks there was a decrease in the physical signs. Then, with two exceptions, most of the patients arrived at a stage where no further change could be made out, and some of them even returned to their former condition. In two cases the physical signs disappeared altogether.

As I stated last year, this method does not appeal to me, nor do I believe

¹ Journal of the American Medical Association, December 5, 1908.

² British Medical Journal, October 10, 1908.

³ Journal of the American Medical Association, November 28, 1908.

⁴ United States Naval Medical Bulletin, October, 1908.

⁵ Lancet, July 17, 1909.

that mercury exerts any beneficial effect on tuberculosis. On the contrary, there is much evidence pointing to the fact that mercury has quite the opposite effect on the disease. Several of my colleagues have given the method a trial, but have failed to substantiate the claims of Wright. Aside from the fact that the drug did not produce any favorable results, the injections were found to be very painful.

Mustard Packs. Herzfeld¹ has for some years used mustard packs in the treatment of *bronchitis and bronchopneumonia in infants*. He prepares the pack as follows: A half pint of water and one-half pint of alcohol are mixed in a large bowl, and to this is added from 6 to 12 drams of freshly prepared spirit of mustard. The spirit of mustard is obtained by adding one part of oil of mustard to 49 parts of pure alcohol.

A large piece of flannel is then moistened in the mustard mixture and wrapped around the child from the neck to the knees. A dry sheet is then placed about the child and the pack is left on until the skin is bright red, usually from fifteen to thirty minutes. When the skin has become sufficiently red the child is removed from the mustard pack and wrapped in a sheet wet with one part of alcohol and two parts of water. At the end of half an hour the wet pack is removed and the child is wrapped in a dry sheet.

One such treatment is usually sufficient; except in very severe cases the treatment need not be employed oftener than once in twenty-four hours.

Herzfeld advises that the physician prepare the first pack himself in order to determine the proper strength of the mustard mixture and to instruct the parents or nurse. He sums up the advantages of the treatment as follows: (1) It is surprisingly rapid in its effect. (2) Its light weight does not materially embarrass respiration. (3) It can be applied without removing the enfeebled patient from the bed. (4) It is inexpensive. (5) It is clean.

Nitrites. As was pointed out in the December issue of *PROGRESSIVE MEDICINE* for 1908, our treatment of arteriosclerosis, particularly when associated with high tension, is directed more along the lines of general hygiene and less to the use of the vasodilators. It is now appreciated that in many cases an increase in the arterial pressure is necessary, and it is only when the pressure becomes abnormally high that active measures are directed against it.

Badger² points out that the existence of arteriosclerosis does not necessarily call for treatment, as there may be no symptoms. In such cases the organism has been able to adjust itself to the gradual changes taking place in the cardiovascular system, with the result that no untoward symptoms occur.

While it is doubtful whether we can remove degenerative changes that

¹ Journal of the American Medical Association, January 16, 1909.

² Boston Medical and Surgical Journal, March 18, 1909.

have already taken place in the arteries, we can in many instances stay the process and prevent further damage. This, as Badger points out, can be accomplished in many cases by cutting out the etiological factor—immoderate drinking, overeating, dissipation, or excessive muscular efforts. And to these factors I would add the excessive use of tobacco.

When the blood pressure becomes unduly high (roughly 200 mm. of mercury, or higher), one of the nitrites is needed. After the pressure has been sufficiently lowered, it is customary to administer iodide of potassium over a long period of time.

In regard to the degree of pressure demanding the active administration of the nitrites, no hard and fast rule can be laid down. As a general rule, a pressure of 200 mm. or higher should be reduced. Occasionally one meets with a case in which there are no symptoms, even with a high pressure; and on the other hand, there are cases with a pressure of 160 or 170 mm. in which marked symptoms are present. Each case is a law unto itself, and the reduction of the blood pressure must depend entirely on the extent to which symptoms are present or there is reason to fear some untoward result, such as an apoplexy.

Badger also calls attention to falling pressures. The importance of low blood pressure in arteriosclerosis is not as fully appreciated as it should be. Low blood pressure in arteriosclerosis is, in my experience, productive of more annoying symptoms than the high pressures. A falling pressure is especially ominous, indicating, as it does, failure of the cardiac muscle. Brunton¹ states that those cases of high tension in which the heart is beginning to fail, and such symptoms as irregularity or intermission of the pulse, giddiness, inability for exertion, shortness of breath, and even edema of the ankles, are beginning to make their appearance, demand particular attention. In such cases cardiac tonics, such as strophanthus, digitalis, strychnine, and caffeine, required to be combined with vascular dilators, whilst rest, comparative or absolute, must be insisted upon as more important than any medication.

Brunton also points out the importance of general hygienic methods in dealing with cases of arteriosclerosis. He states that the first indication in treating rise of tension is to diminish the supply of proteid food, and especially of butcher's meat, and to put the patient on a diet of bread, vegetables, and fruit, with milk, butter, and fat bacon. If the tension is not excessively high, eggs in any form, fish, and fowl may be allowed.

Alcohol, tea, coffee, and tobacco should be prohibited. In individual cases these may be allowed in moderation, provided no untoward effect follows their use.

According to Brunton, tobacco plays an important role in the production of arteriosclerosis. He states that nicotine is almost the only drug which nearly equals adrenalin in its power to raise blood pressure.

¹ *Lancet*, October 17, 1908.

He advises that patients drink very little with their meals, for the two-fold reason that drinking with food is apt to lessen the completeness of mastication, and much fluid dilutes the gastric juice and slows digestion. The best time to drink water is about three hours before eating. Taken at this time it is quickly absorbed, and, in addition, tends to remove from the stomach the remnants of the previous meal. Either plain water, hot water, or one of the waters recommended in gout may be used.

Severe or sudden muscular exertion is to be avoided. Moderate exercise without strain is beneficial.

Equally undesirable is sudden emotion or anger.

Constipation should be avoided, as it tends to raise the blood pressure. To overcome this it may be necessary to administer $\frac{1}{2}$ grain of calomel or from 3 to 5 grains of blue pill once or twice a week, followed by a saline in the morning. Patients subject to angina are often annoyed by distention of the stomach by flatulence. This distention acts in two ways: By tilting the heart, and thus causing mechanical interference with the circulation, and also by reflex action through the vagus. For relieving this flatulence Brunton recommends the following:

R—Liq. trinitrini	℥ss to iij
Spts. ammon. aromat.	℥xv to f̄j
Spts. æther. comp.	℥v to x
Spts. chloroformi	℥v to x
Tinct. cardamomi comp.	℥x to xxx
Aq. menth piper.	q. s. ad f̄j

This dose may be repeated every quarter of an hour until the pain is relieved or until the trinitrin causes giddiness. For very acute pain amyl nitrite may be used and in case of failure with this, inhalation of chloroform may be used.

Brunton ordinarily employs the nitrite of sodium, beginning with $\frac{1}{2}$ grain and gradually increasing the dose to 4 or 5 grains, three times daily. In some cases the pressure can be kept down by the use of from $\frac{1}{2}$ to 2 grains of sodium nitrite, together with 15 to 20 grains of nitrate of potassium, and sometimes with 10 grains of bicarbonate of potassium as well, given in a tumblerful of water every morning.

Matthew¹ has made some very interesting comparative studies of the various nitrites. The time in which the pressure begins to fall was determined as follows: (1) Nitroglycerin or liquor trinitrin, one minute; (2) sodium and potassium nitrites, five minutes; (3) erythrol nitrate, about five and one-half minutes; (4) mannitol nitrate, about twelve minutes. The amount of fall in pressure in millimeters of mercury was as follows: (1) Nitroglycerin, 28 mm.; (2) sodium and potassium nitrites, 32 mm.; (3) erythrol nitrate, 35 mm.; (4) mannitol nitrate, 35 mm.

¹ Quarterly Journal of Medicine, April, 1909.

The average time in which the maximum fall was reached was noted as follows: (1) Nitroglycerin, four and one-half minutes; (2) sodium and potassium nitrites, fourteen minutes; (3) erythrol tetranitrate, twenty-two minutes; (4) mannitol hexanitrate, about one hundred minutes.

Matthew obtained the following results in regard to the rise in pressure after the maximum fall had been reached:

1. With liquor trinitrini (nitroglycerin) the pressure begins again to rise almost immediately a maximum fall has been reached. The rise is slower than the fall, but in all cases the effect of the drug has completely passed off in thirty minutes.

2. Sodium and potassium nitrites have a more extended action. A maximum fall is reached in about ten minutes after the initial action has set in. This is maintained for from forty to fifty minutes. The rise then is slow, and the effect does not pass off until two hours have passed after the administration.

3. Erythrol and mannitol behave alike as regards length of action. The maximum effect is maintained for between one and two hours. The rise is very gradual, and the original level is reached only after five or six hours from the time of administration.

In regard to the dosage and employment of the nitrites in cases of high tension, Matthew emphasizes what I pointed out in *PROGRESSIVE MEDICINE* for last year (December, 1908,), namely, that it must be recognized that in all cases, though within limits, high pressure is not necessarily harmful to the individual, and the idea that it has always to be attacked by every means in our power, in order to obtain again a normal level, has just sufficient truth to be a serious misconception. He looks upon the gradual increase in the blood pressure as a compensatory change. Just as a left ventricle in aortic incompetence has to hypertrophy to accommodate itself to the altered conditions due to the aortic leak, so probably high blood pressure must be considered compensatory if the proper relationship is to be maintained between the various parts of the circulation and between the circulation and the tissues.

In other words, our efforts should be directed toward maintaining at an even level what is for the particular individual a physiological pressure, although, judged by the normal, this pressure may be high. Such pressures demand interference with only when they become unduly exaggerated. Above all things, it must be borne in mind that to unduly lower what may be termed physiological high pressures, only too often leads to more unpleasant symptoms than those previously produced by the high pressure.

From his observations with the nitrites, Matthew found that symptoms, such as pain, headache, giddiness, epistaxis, gastric disorders, etc., were alleviated or disappeared with a reduction of pressure amounting to about 30 mm. of mercury, and if this reduction could be maintained the symptoms did not return and the individual's general condition improved.

As a result of these observations he recommends the following doses of the various nitrites:

1. Liquor trinitrini: Where a single dose, to be repeated if necessary, in half an hour, is prescribed, the author recommends 2 minims as one most likely to obtain the desired effect.

2. Sodium and potassium nitrites: In suitable nitrite cases, 2 grains produces a reduction of just 30 mm. of mercury. This action will last two hours, and only after this is it necessary to repeat it. No benefit is obtained by increasing the dose, and a less dose will not give the desired effect.

3. Erythrol nitrate: With this drug a dose of $\frac{1}{2}$ to 1 grain will produce the beneficial reduction, and the effect will last about six hours. Owing to individual susceptibility to erythrol, and in some cases having obtained sufficient reduction with the smaller dose, the author would recommend that it be used in all cases to start with.

4. Mannitol nitrate: The author has used only tablets of 1 grain. These produce the necessary reduction of pressure and effects. With it he has not observed the same individual susceptibility or any tendency to unpleasant effects, probably owing to the fact that it produces its maximum effect much more slowly than erythrol.

The high tension occurring in Bright's disease and arteriosclerosis is, in the early stages of these conditions, very amenable to the nitrites, but, as Matthew points out, there is ultimately a stage when the nitrites produce little or no effect. He also points out that in heart and kidney cases, in which the blood pressure is raised, and in which, in addition, marked edema is present, the nitrites do not act well. It has seemed to me that in these cases the high pressure was largely the result of a toxic condition due to deficient elimination. Clinically, it can be demonstrated that with the restoration of the kidney function the pressure becomes lower, even without measures directed specifically against the high tension.

The use of *amyl nitrite* for controlling *pulmonary hemorrhage* has been referred to in previous years. Squire¹ also has found it efficient. He uses it in larger doses than have ordinarily been recommended. For slight hemorrhages he uses 10 to 15 minims. Amounts smaller than 10 minims he claims are inefficient. In larger hemorrhages, particularly when the nose gets blocked up with blood, it may be necessary to put from 30 to 60 minims of amyl nitrite on a piece of lint and hold it over the patient's mouth.

For some years there has been a widespread belief that many of the tablets on the market, especially those of nitroglycerin, were absolutely inert and worthless. As the result of an investigation by Edmunds and Roth,² we now have ample proof that the belief in regard to nitroglycerin

¹ Clinical Journal, June 16, 1909.

² Journal of the American Medical Association, December 19, 1909.

tablets has not been altogether true. These observers purchased 17 different samples in the open market, and, as a result of their analysis, conclude that the nitroglycerin tablets hardly deserve the bad reputation which has been given them. While the samples varied considerably in strength, but two of the seventeen specimens could be classed as distinctly poor and none were absolutely worthless.

The length of time elapsing between their manufacture and use is important, as deterioration takes place with the lapse of time. To insure certain results only tablets of a recent issue should be employed.

Phenol (Carbolic Acid). Instances of *gangrene* of a finger or toe following the application of dressings soaked in solutions of carbolic acid have been so frequent that one is at loss to explain why the drug is ever used for this purpose. In 1900 Harrington¹ collected 132 cases, the strength of solution in some instances being only from 1 to 5 per cent.

During the past year J. A. Kelly² and Leighton³ have reported additional cases. In Kelly's case the dressing remained in place from 11 P.M. to 4 A.M., when it had to be removed because of the intense pain. The finger was subsequently amputated. Leighton reports 4 cases. He cites as possible explanations of the gangrene: (1) The mechanical constriction to the circulation due to the contracted and hardened skin, which acts like a tight bandage applied to the part. (2) The possibility of a sclerotic artery, which is not uncommon in the young, playing a part in some of these cases. This last factor seemed to be present in one of his cases.

Taylor⁴ questions the efficiency of *alcohol* as an antidote to carbolic acid. According to his experiments high concentrations of alcohol and low concentrations of carbolic acid seemed to increase the toxicity of the latter. A 1 to 100,000 solution of carbolic acid was more toxic in the presence of 10 per cent. alcohol than without it. In Taylor's opinion the antagonism observed in therapeutic practice probably depends on a physical rather than a chemical basis.

It will be recalled that three years ago, Clarke and Brown⁵ investigated the effect of alcohol in carbolic acid poisoning. While they believed the alcohol to have some beneficial effect, they attached the most importance to a thorough washing out of the stomach by lavage.

Judd⁶ reports on the successful use of carbolic acid and alcohol in the treatment of *erysipelas*. He has employed this method in 82 cases, with 5 failures, 10 delayed recoveries, and 67 with complete remission of symptoms in from twelve hours to four days. His series represents all forms of the disease.

¹ PROGRESSIVE MEDICINE, December, 1907, p. 310.

² Annals of Surgery, February, 1909.

³ St. Louis Medical Review, February, 1909.

⁴ Journal of Biological Chemistry, December, 1908.

⁵ PROGRESSIVE MEDICINE, December, 1907, p. 309.

⁶ Medical Record, February 13, 1909.

The first effect of the treatment is a complete cessation of the itching, burning, and throbbing. In a few hours the temperature and pulse become normal, and nausea, if present, quickly subsides.

The method is as follows: The entire involved area and extending about half an inch into the surrounding apparently healthy skin is painted with a swab of cotton dipped in a 95 per cent. carbolic acid solution. This is left on until the purplish color of the inflamed area is replaced by a pretty complete whitening of the skin. It is essential that this whitening occurs, but care must be taken to see that it does not proceed to a thorough blanching, as a burn, and slough of the skin may result. Where large areas are involved it is advisable to paint only a portion at a time.

The second step consists in going over the carbolized area very thoroughly with a swab saturated with pure alcohol. It is essential that the healthy skin beyond the infected area be included; otherwise the disease may extend in spite of the treatment.

The treatment may be applied to the hairy scalp, the eyelids, the mucous membrane of the alae of the nose, and the nipple of the breast.

Judd has not noted any serious untoward effects from the treatment. Occasionally the urine is darkened and has the characteristic odor which follows the absorption of carbolic acid.

Davis¹ also advocates the use of carbolic acid in the treatment of erysipelas. He employs the following mixture:

Carbolic acid	. . . . .	3 parts
Spirit of camphor	. . . . .	6 parts
Alcohol	. . . . .	1 part

The large amount of carbolic acid penetrates the skin, destroys the infection promptly, and leaves no scars. There is a little smarting for an instant. The alcohol and camphor counteract the burning effect of the acid, and, in addition, the camphor counteracts any that may be absorbed into the system.

The solution is freely applied to the infected area and for half an inch beyond, by means of a cotton swab. In mild cases one application daily is sufficient; in severe cases the application may be repeated two or three times daily. When first applied the mixture causes intense reddening of both the healthy and diseased skin.

If the skin is uncomfortably hot or dry, Davis usually, after applying the solution, covers the infected area with gauze wrung out in cold sterile salt solution.

Jackson² has for years employed the following method in treating *boils*. As soon as the boil has pointed, and this is the rule when the patient

¹ Monthly Cyclopedia and Medical Bulletin, May, 1909.

² American Journal of the Medical Sciences, June, 1909.

is first seen, a small piece of cotton is wound around the end of a sharply pointed stick, dipped in a 95 per cent. solution of carbolic acid, and bored into the softened point of the boil. This not only allows the pus to escape, but thoroughly disinfects the cavity of the boil. The boil should not be squeezed. The surface of the skin over and about the boil is then washed with peroxide of hydrogen or a 1 to 1000 bichloride of mercury solution. A 5 to 10 per cent. *salicylic acid ointment* is then spread over a piece of lint or several thicknesses of gauze and placed over the boil. The salicylic acid dressing should be continued for a week. Jackson states that this treatment is all that is necessary. In the case of very large boils the operation may have to be repeated the following day. The same method is to be followed in case fresh boils appear in the same region, the result of infection of the skin follicles before this treatment was instituted.

Jackson states that a boil may be aborted, if seen before pointing has occurred, by injecting into it a drop of a 5 to 10 per cent. solution of carbolic acid or touching its top with 95 per cent. carbolic acid. The salicylic acid ointment is used as a dressing, as in the treatment of a fully developed boil.

Hot boric acid compresses may be used to relieve pain, but Jackson does not think they are necessary. The puncturing of the boil with pure carbolic acid not only relieves the tension, but the acid also produces an anesthetic effect.

Phenolphthalein is a comparatively new synthetic cathartic. It is a crystalline substance produced by the interaction of phenol and phthalic anhydride. It is moderately soluble in alcohol (90 per cent.) but very slightly so in water.

Elmer¹ has carried out a series of experiments on dogs to determine the action of the drug, its possible toxic effects, and the proper dosage. In neither his experimental nor his clinical trials did he encounter a toxic effect. Of the 112 cases in which he employed the drug, the dose varied from 1 to 10 grains daily, and this may be increased to 25 or 30 grains daily without producing a toxic effect. According to Elmer's experience, the drug is best prescribed in powder form. It is tasteless and odorless. The average dose is from 1 to 5 grains, given either at night or in divided doses after meals. In cases of hyperacidity it may be combined with an antacid powder.

Buckley² has stated that phenolphthalein had a tendency to produce bleeding in hemorrhoids. In 10 cases of constipation associated with hemorrhoids Elmer noted no such effect.

Gillette³ reports the case of a child, aged three years, who took twenty-

¹ Medical Record, November 14, 1908.

² British Medical Journal, 1905, p. 302.

³ Journal of the American Medical Association, November 21, 1908.

five or more 1-grain phenolphthalein tablets. The stomach was washed out ninety minutes after the tablets had been taken. Aside from a few bowel movements, the child showed no ill effects from the drug.

Benedict¹ states that phenolphthalein is of little use when given in a single case. It is best employed as is cascara. At first it may be given thrice daily for several days or even a week or more. Then, depending on the effect produced, it may be reduced to one dose daily or given only on alternate evenings.

In Benedict's experience phenolphthalein does not interfere with the ordinary urinary tests, except that for peptone and sugar or with an alkaline solution of copper.

He believes that the drug is of benefit in cases more or less established, as biliary lithiasis, hepatic torpor, and congestion. It also seems to diminish the amount of indol in the feces and indican in the urine. These observations Benedict admits are purely clinical.

Another point of interest is its possible use as a urinary antiseptic. Benedict mentions that several specimens of urine from patients taking the drug and which had been kept on account of special interest remained free from obvious decomposition for a week or more.

Picric Acid. During the last few years picric acid has been extensively employed in the treatment of *burns*, and, according to the testimony of those best qualified to judge, is the most efficient treatment we possess. Teass² has employed picric acid so successfully in the treatment of burns that he believes it should always be at hand in convenient shape for immediate use in all places where there is any likelihood of burns occurring.

Teass gives the indications for the treatment of burns as follows: (1) To relieve pain and overcome shock. (2) To prevent infection and thus prolonged sloughing. (3) To guard against congestion and inflammation of the internal organs.

Pain and shock are combated as in any other condition. In regard to the burned surface, it must be kept in mind that it is a surgical condition and is to be treated as any other surgical condition, namely, with absolute cleanliness. In order that there may be no delay in applying the picric acid solution, Teass has gallon bottles filled with a 4 per cent. aquo-alcoholic solution of picric acid distributed in those parts of the smelter where men are most exposed to the danger of burns. The foremen are instructed that when a man is burnt to cover the burned areas and the clothing in their vicinity with the picric acid solution and then send him to the hospital.

The picric acid is applied immediately, because it not only relieves pain, but because, in Teass' opinion, it is the most efficient surgical dressing

¹ Therapeutic Gazette, September, 1909.

² California State Journal of Medicine, April, 1909.

we possess. He has never seen infection after its use nor has he met with an instance of poisoning. Moist picric acid dressings have the additional advantage of protecting the patient against erysipelatous infection.

The only disadvantage the picric acid possesses is that of staining yellow everything it comes in contact with. This disadvantage can be overcome, however, by the attendant wearing rubber gloves. The yellow stain can also be removed by washing with alcohol or a solution of ammonia.

Pituitary Extract. A number of interesting and important papers have appeared during the past year on the use of pituitary extract in the treatment of *shock*. So far the use of the extract has been confined to experimental purposes, but these experiments indicate that solutions of the pituitary gland may be injected into the circulation under the same conditions as adrenalin, and that in some respects the pituitary extract is superior to adrenalin.

The most important papers which have appeared are those by Mummery and Symes,¹ Houghton and Merrill,² Pal,³ and Bell and Hick.⁴

Pituitary extract has been found to exercise the same effect on blood pressure as does adrenalin, but with the distinct advantage of being more prolonged in its action. Pal showed that, aside from a slowing of the pulse beat, pituitary extract produced a very characteristic blood pressure curve. At first the pressure is slightly lowered, but this quickly gives way to an increase in pressure which, unlike adrenalin, is gradual and continues for some time, upward of an hour according to Mummery and Symes.

As a result of their animal experiments, Mummery and Symes assert that the injection of pituitary extract before serious trauma is done to an animal gives the arterioles a tone which prevents the collapse of the bloodvessels incidental to failure of the vasomotor centres. Bell and Hick, in their research, also found pituitary extract of service in raising the blood pressure. They also believe that it is of service in causing uterine contractions and that it may be used in place of eserine in paralytic distention of the bowel.

Houghton and Merrill investigated the claim as to whether the pituitary extract possesses any diuretic action, it having been asserted by Shafer that the pituitary extract had a specific secretory effect. In their experiments they were unable to demonstrate any such action. "If it does have this specific action it has it to a much less degree than sodium chloride itself."

The extract of the pituitary body has been prepared by Parke, Davis & Co., under the name of *pituitrin*.

¹ British Medical Journal, September 19, 1908.

² Journal of the American Medical Association, November 28, 1908.

³ Wiener klin. Wochenschrift, January 16, 1909.

⁴ British Medical Journal, March 27, 1909.

Quinine. In Harding's¹ opinion the following method of treating *malaria* is most efficacious. With slight modifications it is the plan used by Koch.

When first seen, unless there are obvious reasons to the contrary, the patient suspected of having malaria is given 5 grains of calomel, and this is followed in six or eight hours by a saline. At the time the calomel is given a blood film is taken and examined at once, or, at least, within eight hours. If parasites are found the patient is immediately given 15 grains of sulphate of quinine, dissolved with a slight excess of sulphuric acid in one ounce of water. The drug is given by mouth irrespective of the temperature, and if the quinine is vomited the dose is repeated. In Harding's experience it has never been necessary to do this more than twice. If there is any doubt as to the nature of the parasite or the number of broods present, a second film is taken before the quinine has had time to absorb. Still another film is taken if parasites are not found, but from the presence of pigment granules, a large mononuclear increase, or swollen and mauve-colored erythrocytes there is reason to suspect malaria. If only small rings are found films are examined at the end of a week and continued until crescents are found; if at the end of a week's daily search rings only are found, the case is recorded as "parasite found but not differentiated." In Harding's opinion it is impossible to be certain of the nature of a small ring.

The rule, "no parasites, no quinine," is strictly adhered to. Harding insists on the microscopic diagnosis, as without it failure is sure to follow. He has known quinine to be administered in cases of liver abscess, septicemia, pneumonia, syphilis, and the undetermined Indian fevers, on the supposition that malaria was present.

If the microscopic diagnosis is positive the quinine is repeated on seven consecutive mornings, when the patient is, as a rule, fit for discharge. At the time of discharge the patient is given a paper telling him the days he is to attend for further doses and a duplicate is kept at the hospital. As the succeeding doses are taken the date is checked off. Harding agrees with Koch that a six weeks' course of quinine is not invariably sufficient, whereas if the treatment is continued for three months, relapses seldom occur.

The scheme to be observed is as follows:

A man in whom the parasite was found May 1 would receive doses on May 1, 2, 3, 4, 5, 6, 7, 11, 12, 13, 21, 22, 23, 31, June 1, 2, 10, 11, 12, 20, 21, 22, 30, July 1, 2, 10, 11, 12, 20, 21, 22, 30, and 31, *i. e.*, not fewer than thirty doses. The dates for the after treatment are calculated by taking the tenth and two subsequent days from the first dose, and every tenth day after them for three months.

In cases of malignant tertian malaria films are taken from time to time

¹ Journal of the Royal Army Medical Corps, September, 1908.

to see if the crescents have disappeared, and on the completion of the treatment films are again taken.

Waugh¹ quotes opinions to the effect that the *hydrobromide of quinine* is the most efficient salt of quinine, because of its energy and promptness of action and its absolute harmlessness, especially in urgent and pernicious cases, where large doses of quinine are requisite.

Quinine at one time was highly recommended as a stimulant to the uterus in cases of inertia. Its use for such purposes is now largely abandoned. It is interesting to note that two Indian physicians, Bhupal Singh and Chakravarty,² express the opinion that in the presence of malarial infection complicating pregnancy quinine is not a dangerous remedy, and that there is far more danger of abortion if the malaria is not combated by quinine than if quinine is freely used.

The use of quinine in the treatment of *croupous pneumonia* has been mentioned in previous numbers of PROGRESSIVE MEDICINE. I can only repeat that the routine use of quinine, iodide of potassium, digitalis or guaiacol carbonate in the treatment of pneumonia has little to recommend it. The instances that have come to my notice advocating these various drugs have never been convincing, based, as they usually are, on a series of a few cases without a death.

Keown³ has recently reported a series of 15 cases of pneumonia with 1 death. Deductions from such a small number of cases are valueless.

The only single advance that has been made of recent years in the treatment of pneumonia is in the use of fresh air.

Salicylates. A number of articles have appeared during the past two or three years advocating the use of large doses of the salicylates in the treatment of *acute articular rheumatism*. It seems to be pretty generally understood at the present time, that the salicylates to be effective in acute rheumatism must be administered in doses of from 100 to 150 grains in the twenty-four hours, and some have advised amounts twice as large.

Plehn⁴ does not believe that the salicylates have a toxic action on the kidneys. Transient albuminuria is a not infrequent occurrence in acute articular rheumatism, and is, in his opinion, in no way connected with the salicylates. On the contrary, existing acute or chronic nephritis was always benefited by the salicylates. Withholding the salicylates or using them half-heartedly, on this account, exposes the patient to more serious complications, which proper salicylate treatment would have prevented.

Plehn prefers the pure salicylic acid to any of the salts. His method is as follows: Fifteen grains every two hours, or $7\frac{1}{2}$ grains every hour

¹ Chicago American Journal of Clinical Medicine, November, 1908.

² Indian Medical Gazette, February, 1909.

³ New York Medical Journal, June 12, 1909.

⁴ Deutsche med. Wochenschrift, December 17 and 24, 1908.

during the first day, but none during the first night, making a total of 75 grains. This is continued until the temperature has been normal for three days and all pains and other disturbances have disappeared. He then gives 60 grains a day for a week, and the patient is then kept in bed for three days longer without any drug. This plan is pursued in every case unless the untoward effects are severe, when the dose is modified. He found that women do not bear large doses as well as men. The drug should not be administered on an empty stomach.

Plehn also believes that the salicylic acid acts prophylactically so far as the heart is concerned. Complications, such as endocarditis and pluerisy, occurred less frequently when the drug was given freely than when it was withheld. He states that out of 319 cases treated by him with salicylic acid, only 2 left the hospital with chronic heart disease, due to the attack of rheumatism for which the patient had been treated.

Earp,¹ after freely opening the bowels, administers 30 grains of sodium salicylate every three hours until pain is relieved or there are unpleasant head symptoms. The dose is then reduced to 20 grains every three hours. When the joints can be freely moved without pain or stiffness the dose is further reduced to 15 grains four times a day. When recovery seems to be complete, 10 grains are given three times daily for two weeks. During the time the salicylates are being administered the patient is encouraged to drink freely of water.

Lees² is of the opinion that salicylic acid is given in insufficient doses because of the belief that it is a cardiac depressant. He insists that it is not a depressant, and that all the unpleasant effects of the drug can be obviated by combining with the salicylate twice the amount of bicarbonate of sodium. For the first day Lees administers to an adult 15 grains ten times, or 150 grains. On the second day he increases each dose 2 grains or 20 grains for the day. He continues until the temperature reaches and stays normal.

For a child from seven to twelve years old, he gives from 10 to 100 grains daily, and for a child under seven from 5 to 50 grains, with twice the amount of sodium bicarbonate in each case. In severe cases, and in those with choreic symptoms, he advises enormous doses, having given as much as 400 grains, and in one instance 600 grains, of sodium salicylate and 1200 grains of sodium bicarbonate.

While such doses are certainly heroic and probably not used by many, it shows that they can be tolerated, especially when combined with sodium bicarbonate.

For rheumatic pericarditis, Lees recommends an ice-bag over the heart and warm bottles applied to the lower extremities. He also thinks an ice-bag over the heart is of service in rheumatic endocarditis.

¹ New York Medical Journal, May 1, 1909.

² British Medical Journal, January 16, 1909.

H. A. Hare¹ prefers the salicylate of strontium in doses of from 100 to 150 grains in each twenty-four hours for four or five days, administering simultaneously an equal or greater quantity of sodium bicarbonate.

Strophanthus. Recent investigators have claimed that strophanthus or its active principle, *strophanthin*, is far more efficient when administered subcutaneously or intravenously than when given by mouth. As the result of experimental studies with the drug, Hatcher² has shown that three times the amount can be administered by mouth than can be safely administered intravenously. He also quotes Hockheim as having given ten times the fatal dose of strophanthus by mouth that could be given intravenously without acting deleteriously upon a human being, beyond the development of a severe diarrhea. The explanation of this lies in the fact that the strophanthin is rapidly excreted into the intestine, this excretion being more rapid than that by the kidneys. As a result of this rapid excretion into the intestines Hatcher believes there is never enough strophanthin present in the circulation to powerfully influence the heart. He concludes, therefore, that the oral administration of the drug is irrational.

Fleischmann and Wjasmensky³ report favorable results from the intravenous use of strophanthin in 32 cases, and Flesch⁴ adds a single case.

Given intravenously, strophanthin is administered but once daily in doses of from $\frac{1}{50}$ to $\frac{1}{300}$ grain. There are two forms of strophanthin—an amorphous and a crystalline. Hatcher and Bailey⁵ have found that the crystalline form is two and one-half times more toxic for cats, dogs, rabbits, and guinea-pigs when given subcutaneously. The crystalline strophanthin is the remedy of choice, for, besides being more powerful than the amorphous form, it is produced in a fairly definite strength.

Strophanthin may also be administered subcutaneously.

H. A. Hare,⁶ in an editorial comment on the intravenous use of strophanthin, states that it is manifest that a drug which can be depended on only when used intravenously has very distinct limitations to its usefulness. It is his belief that the advantages of strophanthus as a cardiac stimulant are not sufficient to counterbalance the dangers of intravenous injections. Personally, he would prefer to use *digitalone* hypodermically in those cases demanding a rapid and efficient cardiac stimulant.

The accepted teaching regarding the action of strophanthus on the heart has been that the drug acts as “a stimulant to the heart muscle and its ganglia, but does not slow the pulse by its action on the vagus as does *digitalis*” (Hare). Bachmann⁷ has recently published some obser-

¹ Therapeutic Gazette, May, 1909, p. 325.

² Journal of Physiology, January, 1909.

³ Deutsche med. Wochenschrift, May 27, 1909.

⁴ Wiener klin. Wochenschrift, November, 12, 1908.

⁵ Journal of the American Medical Association, January 2, 1909.

⁶ Therapeutic Gazette, April, 1909.

⁷ Archives of Internal Medicine, September, 1909.

vations on the action of strophanthus in a case of *complete heart block* (Stokes-Adams syndrome). His results are opposed to the usual teaching concerning the drug. Bachmann administered 5 minims of the tincture of strophanthus three times a day from November 21 until November 25, when the dose was increased to 10 minims. The drug was continued at this dose until December 7, 1908, when it was withdrawn altogether. Tracings were taken just before the administration of the drug, and then afterward sufficiently often to determine the reaction of the heart toward the drug. These observations were continued after the withdrawal of the drug.

The most striking effect of the action of strophanthin on the heart's action was shown in the notable decrease in the frequency of the auricular contractions, while, on the contrary, the ventricular rate was conspicuously increased. In this way there was brought about an approximation toward normal heart action. Bachmann states that these findings are a confirmation of the statement previously made by him,¹ namely, that strophanthus slows the heart by stimulating the vagus nerve.

These observations of Bachmann, together with others, seem to show that there exists a certain parallelism in the mode of action of strophanthus and digitalis (digitalin) in bringing about a decrease in the frequency of the heart.

In the case studied by Bachmann the slowing of the auricles and the increase in the rate of the ventricles persisted after the withdrawal of the drug. The improvement of the circulation was remarkable. The syncopal and epileptiform seizures which had been increasing in frequency and severity gradually became less frequent, and in a short time disappeared, not to return again, even after the withdrawal of the drug.

The patient felt so well that he left the hospital.

Stypticin (Cotarnine Hydrochloride) is a most efficient drug for the control of *uterine hemorrhage*. It is best administered in the form of sugar-coated pills or capsules in doses of $\frac{1}{4}$ to $\frac{3}{4}$ of a grain three or four times daily. Berger² has cited a number of cases illustrating its use. His conclusions are as follows:

1. In all cases of hemorrhage from the uterus determine the cause, and treat each case on its own merits, bearing in mind the relative greater frequency of miscarriages, and take measures to protect yourself.

2. Select the proper hemostatic. In all cases of uterine hemorrhage, in the absence of foreign bodies in the uterus, such as secundines (tumors, as polypi and cancer, are also included, for these should be regarded as foreign bodies), stypticin should be thought of as the "first aid to the injured." When there are bits of placenta remaining in the uterus, such as occurs after incomplete abortion, first empty the uterus by using ergot, then prescribe stypticin to stop the hemorrhage.

¹ American Journal of the Medical Sciences, 1909, vol. cxxxvii, pp. 342, 364.

² Therapeutic Gazette, August, 1909.

3. Stypticin is very effective in controlling excessive menstruation. Its administration should be begun several days prior to the expected period.

4. In obscure cases of hemorrhage from the uterus, stypticin is the superior hemostatic to be employed. If you know the cause, treat the underlying conditions.

5. Not all cases of incomplete abortion require curettage, for when the uterus is emptied stypticin will almost always stop the bleeding.

6. The usual causes of hemorrhage from the uterus are local, and stypticin should be administered almost as a routine, because there are no dangers connected therewith and its action is nearly always a foregone conclusion.

Bonney¹ also reports favorably on the use of stypticin in uterine hemorrhage. He states that in addition to controlling hemorrhage it has the additional advantage of alleviating certain forms of pelvic pain, chiefly those of menstrual incidence associated with an abnormal amount of loss.

The only objection to the drug, especially in hospital practice, is the expense.

Thiosinamin has been recommended in the treatment of *strictures* and other conditions associated with the formation of fibrous tissue. Under its use the fibrous tissue is said to become absorbed. While a number of reports favorable to its use have appeared, it has never come into general use.

G. J. Müller² states that he has obtained good results in the treatment of *tabes dorsalis* from injections of the following solution: Thiosinamin and glycerin, each, 1 part; sodium salicylate, 2 parts; and enough distilled water to make 10 parts, all by weight. About 15 minims are injected daily into the gluteal muscles.

In 5 patients out of 11 the treatment was followed by the complete cessation of fulgurant pains, and in the other 6 the ability to sleep had been regained. In one case gastric crises were relieved; in another, vesical and rectal crises, and in a third, laryngeal crises. Urination became easier in all of them. The general conditions of all the cases was improved. Müller suggests that this may have been due to the relief from pain and the ability to sleep.

The treatment had little or no effect on the ataxia of the lower limbs and none at all upon the other objective manifestations characteristic of the disease.

Fibrolysin, a modification of thiosinamin, has been employed for the same purposes as the latter substance. Brandenburg,³ as a result of some experimental observations on the effect of fibrolysin on scar tissue, concludes that it is without any lasting influence on scar tissue. In his

¹ Clinical Journal, April 2, 1909.

² Semaine Medical, May 26, 1909; New York Medical Journal, June 19, 1909.

³ Archiv f. klinische Chirurgie, 1909, Band xcviii, Heft 1.

opinion the good results reported must have been brought about by other treatment combined with its use, as, for instance, massage and hot air, in Dupuytren's contraction, or frequent sounding in case of stricture or stenosis.

Trichloracetic Acid. Iverson¹ says that the local application of a solution (50 per cent.) of trichloracetic acid to an operative wound will prevent adhesive inflammation in the neighboring parts and will also prevent infection of the wound. When cut tissues are smeared with the trichloracetic acid solution the albumin is coagulated and a white film of acid albumin forms. This adheres strongly to the tissues and prevents the development of bacteria. Furthermore, the openings of the bloodvessels are closed, and this tends to prevent secondary hemorrhages, especially from mucous surfaces when adrenalin has been used.

Iverson has found this method particularly serviceable on mucous membranes or in operative fields in which infection is likely to occur, as the rectum and female genital tract. In operating on hemorrhoids, or in performing perineoplasty and allied operations, he always touches up the sutured wound with a solution of trichloracetic acid.

Urotropin (Hexamethylenamin). Last year² I reviewed a paper by Crowe on the use of urotropin for sterilizing the bile and other secretions of the body. He showed that urotropin could be demonstrated in the cerebrospinal fluid, even after very small doses by the mouth. One case of *cerebrospinal fistula* with a purulent discharge was cured by the oral administration of urotropin.

Crowe³ has published the results of additional experiments. His conclusions are as follows:

1. Urotropin (hexamethylenamin), when given by mouth, invariably appears in the cerebrospinal fluid. This fact has been demonstrated by a large number of observations on man, and is also true for dogs and rabbits.
2. The largest amount of urotropin is present in the cerebrospinal fluid from thirty minutes to an hour after the ingestion of the drug.
3. After doses of urotropin, within therapeutic limits, a sufficient amount of the drug appears in the cerebrospinal fluid to exercise a decided inhibitory effect on the growth of organisms inoculated into this fluid after its removal from the body.
4. Following a subdural inoculation of dogs and rabbits with streptococcus, from 60 to 80 grains of urotropin a day, given under conditions which insure absorption, will markedly defer, and in some cases prevent, the onset of a fatal meningitis.
5. In view of these observations, the prompt administration of urotropin is advised in all clinical cases in which meningitis is a possible or

¹ Wisconsin Medical Journal, December, 1908.

² PROGRESSIVE MEDICINE, December, 1908, p. 324.

³ Johns Hopkins Hospital Bulletin, April, 1909.

threatened complication, or even when meningeal infection has actually occurred.

During the administration of urotropin the urine should be watched, as the drug sometimes causes marked irritation of the kidneys, a fact pointed out by Beardsley last year.¹

Rowell² reports the case of a child, aged nineteen months, which first developed erysipelas; three days after the onset of the erysipelas marked cerebral symptoms developed with high temperature, opisthotonos, and rigidity in the cervical region.

Acting on Crowe's suggestion, urotropin was given in 1 grain doses every four hours. Within twelve hours the temperature began to fall. The meningeal symptoms gradually diminished and, although the erysipelatos process was somewhat prolonged, the child recovered.

Venesection. The great value of venesection in *heart disease* with failing compensation has been referred to in previous numbers of *PROGRESSIVE MEDICINE*. Hale White³ gives as the chief indication for performing phlebotomy any condition in which there is dilatation of the right heart. This is most frequently seen in disease of the mitral valve or as a result of bronchitis or pneumonia.

In regard to the type of case requiring bleeding, White quotes Sir Samuel Wilks as follows: "You see your patient sitting up in bed, the face, tongue, and lips blue or purple, and the jugular veins starting out of the neck and often visibly pulsating; the heart beating quickly and perhaps a tricuspid bruit, indicating the gorged right heart and obstructed lungs; the veins in the body are full to bursting."

Bleeding in such a case has in most instances an extraordinary effect—the lividity passes off, the pulse improves, and the breathing becomes quieter and less labored. It is not unusual to see such a patient, who before the phlebotomy was sitting forward, gasping for air, able to lie down without discomfort.

As White points out, weakness of the pulse, so far from being a contraindication to bleeding, is an urgent reason for doing it. In fact, the worse the pulse in cases of failing compensation the more necessary the bleeding.

The amount of blood to be withdrawn is placed by White at from 10 to 15 ounces. In my experience, it is best to allow the bleeding to continue until about 30 ounces are taken. It is rare that one can obtain more, as the bleeding usually ceases of itself before this amount is reached. Another advantage in bleeding heart cases is that digitalis, which before the phlebotomy was ineffective, begins to exert a beneficial action owing to the improved condition of the circulation.

Hinton⁴ advises bleeding in cases of sthenic congestion, particularly

¹ *PROGRESSIVE MEDICINE*, December, 1908, p. 324.

² *Journal of the American Medical Association*, November 13, 1909.

³ *Clinical Journal*, March 31, 1909.

⁴ *Therapeutic Gazette*, January, 1909.

pneumonia. He calls attention to the fallacy that the amount of blood commonly removed by a phlebotomy can be injurious.

Veratrum Viride has long been employed, especially in the southern part of the United States, for the purpose of combating *puerperal eclampsia*. Mangiagelli, of Milan,¹ states that he was led to employ the drug in eclampsia from a paper presented to the International Congress of Obstetrics in Geneva, in 1896, by the late Theophilus Parvin. He now reports his experience with 100 cases seen in the past ten years.

Mangiagelli uses a sphygmomanometer, and whenever the blood pressure exceeds 160 mm. he administers from 5 to 10 minims of the fluid extract of veratrum viride hypodermically. He believes that the hypodermic use of the drug is the most efficient way of administration, and that so long as the pulse remains full, strong, and tense the drug must be continued at short intervals. Small and repeated doses are to be preferred to large ones at long intervals.

Mangiagelli agrees with American practitioners that the pulse must be kept, if possible, below 80 beats per minute, but that when the pulse is rapid and small and the blood pressure low, veratrum viride must not be employed. In his 100 cases, 71 were primiparæ; three were moribund when admitted to the hospital, and died shortly afterward. In three others there were evidences of cerebral hemorrhage, which at autopsy proved to be the case. Excluding these 6 cases, the mortality for the remaining 94 was 6.34 per cent., and if all the cases were included the mortality was only 12 per cent. His mortality for the previous ten years before employing veratrum viride was 23.68 per cent.

The statistics of others who have employed the drug vary from 16 to 37 per cent.

Febris,² another Italian, has found the drug so useful in eclampsia that he regards it as almost a specific. In addition to cases reported by himself, he reviews seven articles in the Italian literature attesting to the value of the drug.

Todd³ deprecates the disuse into which veratrum viride has fallen. In addition to employing it in eclampsia, Todd has for many years prescribed the drug in the sthenic fevers and in conditions associated with high arterial tension.

In eclampsia he employs Norwood's tincture in doses of from 5 to 10 minims. In other conditions he gives $1\frac{1}{2}$ minims, or three ordinary drops, at three-hour intervals. He states that the depressing effect of the drug can be prevented by administering $\frac{1}{20}$ grain of morphine, 3 minims of laudanum, or $\frac{1}{2}$ dram of paragoric with each dose of the veratrum. Given in this dose and combined with a small dose of opium the drug

¹ British Medical Journal, September 19, 1908.

² Gazzetta degli Ospedali, May 4, 1909.

³ Therapeutic Gazette, February, 1909.

never produces nausea, vomiting, diarrhea, profuse sweating, giddiness, or symptoms of collapse.

Todd states that *veratrum viride* is also a valuable antidote in the treatment of opium poisoning.

He employs the drug principally in the treatment of *cardiovascular diseases* where there is increased blood pressure. In prescribing *digitalis* to these cases he always combines with it *veratrum* to counteract the influence of the *digitalis* on the arteries.

The following formula has been found useful:

R.—Fr. <i>veratri viridi</i> (Norwood)	mxlv
Pulv. <i>digitalis</i> ,	
Pulv. <i>scilla</i>	āā 5ss
<i>Strychninae nitratis</i>	gr. ss
Pulv. <i>zingiberis</i>	5j
M. et ft. in capsules No. xxx.	
Sig.—One capsule every four, six, eight, or twelve hours, as needed.	

This combination of drugs hitherto considered as strongly antagonistic, at first sight appears unwise, but Todd is so sure of the excellent effects obtained thereby that his formula is given.

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